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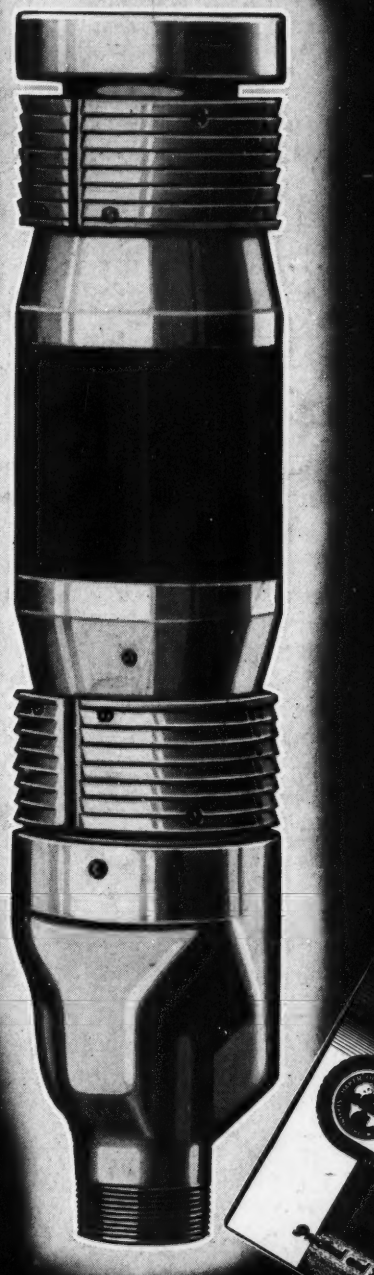

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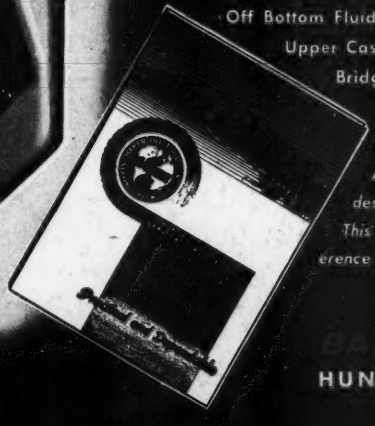

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IN THIS ISSUE

Use of Sea Water in Natural Gasoline Plant Cooling 3

High Executive Personnel Changes in Union Oil Co. 10

Manufacturing Organic Chemicals from Natural Gas Hydrocarbons.... 12

State Drilling Report 18

Laugh This Off 19

San Joaquin Valley Development 20

Los Angeles Basin Development 24

Coastal District Development 26

Crude Oil Production 33

In this issue are published two interesting papers presented before the California Natural Gasoline Association.

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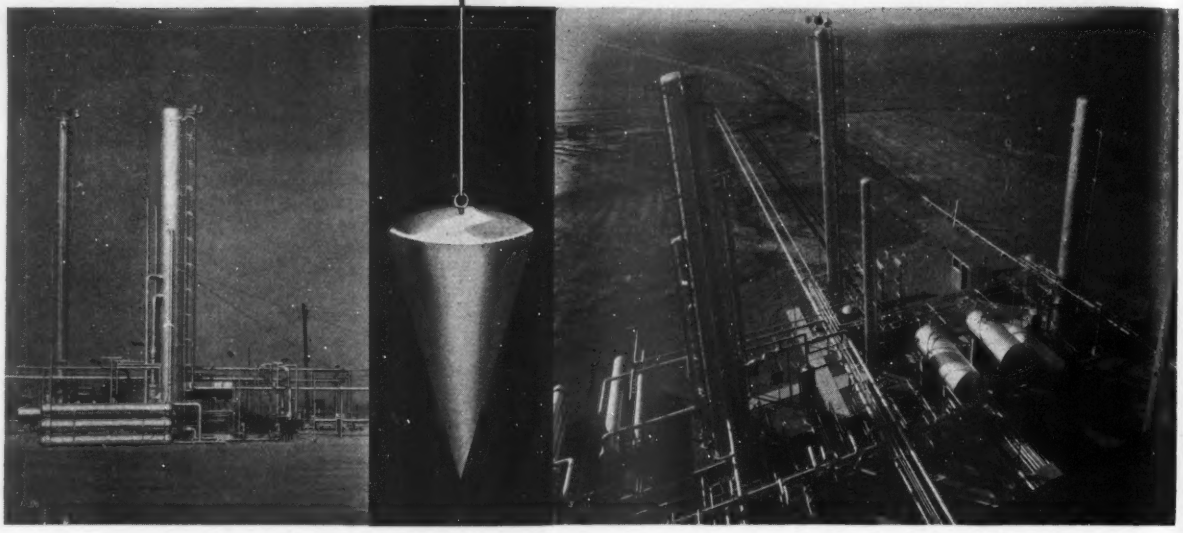
PRECISION



These two views show exactly the same area of the same gasoline plant. The view on the right was taken from atop the cooling tower looking down into the plant yard to show the placement and number of vessels. The view on the right, taken from the edge of the plant yard, shows the precision of their alignment.

Stearns-Roger and Parkhill-Wade hold to the contention that precision is every bit as much a vital element in the construction of natural gasoline plants as it is in the manufacture of the most delicate, fine watch part. In the final analysis, precision in the finished product is the craftsman's faithful physical interpretation of the engineer's equally precise clear planning on his draughting board which, in turn, results from a sound analysis of the basic problems presented by the job to be done.

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Use of Sea Water in Natural Gasoline Plant

Cooling System Proves Success

By M. W. Kibre,
Gas Engineer, General Petroleum Corp.

The importance of an adequate cooling system need hardly be emphasized to those in the Natural Gasoline industry. We are all familiar, more or less, with the effect on the extraction efficiency of an absorption plant when conditions militate against the proper cooling of the gas, absorption oil and condensation products. For example, when lean oil temperatures rise 10° F., either we are faced with a serious loss of production, or we must supply about 20% more oil circulation over the absorbers in order to obtain an equivalent extraction efficiency, which in turn diminishes the plant income because of the increased steam load and fuel costs. Further, when condenser temperatures rise appreciably and the natural gasoline distillate is improperly cooled, the plant revenue may be even more drastically affected because of the cost of handling the resulting additional vapor load, particularly if the plant is operated to recover a high percentage of the lighter hydrocarbons such as propane and isobutane.

In designing the cooling system for a natural gasoline plant, engineers then must strike an economic balance between the cost of cooling surface and the economics of the factors dependent upon temperature in gasoline extraction, for the available cooling water conditions. It can be readily appreciated that this problem is, to a considerable degree, simplified and capable of a more accurate evaluation, when cooling water conditions can be depended upon to remain practically constant with respect to a definite maximum throughout the year. Where cooling water temperatures are largely a function of climatic conditions, as in the conventional plants equipped with cooling towers, seasonal temperature fluctuations will not permit a very conservative provision for cooling surface. The design of the cooling towers with reference to the wet bulb temperature approach for the cooling water adds the further complication that to some extent unpredictable conditions of wind velocity, wet and dry bulb temperatures, must be estimated when deciding upon the cooling tower capacities.

In many cases companies are forced to use the poorest set of atmospheric conditions which may exist in the locality, rather than average conditions, in designing the cooling tower capacities. A wind velocity as low as one mile per hour is in some instances elected as a design factor for natural draft towers, when plant operation requires the maintenance of the cooling water at as low a temperature as possible. Obviously, the expense of cooling tower installations mounts in proportion to the increased size of the towers required where operation requires the selection of the poorest climatic conditions for design purposes.

As shown by G. R. Nance and H. A. Dresser of the Fluor Corporation in their paper on the subject of cooling towers, recently presented before this Association, tower sizes must be doubled when wind velocities of one mile per hour instead of ten miles per hour must be selected. Further, tower size must be increased two and a half fold when it is desired that the wet bulb temperature approach of the cooling water shall be 10° F. instead of 20° F.

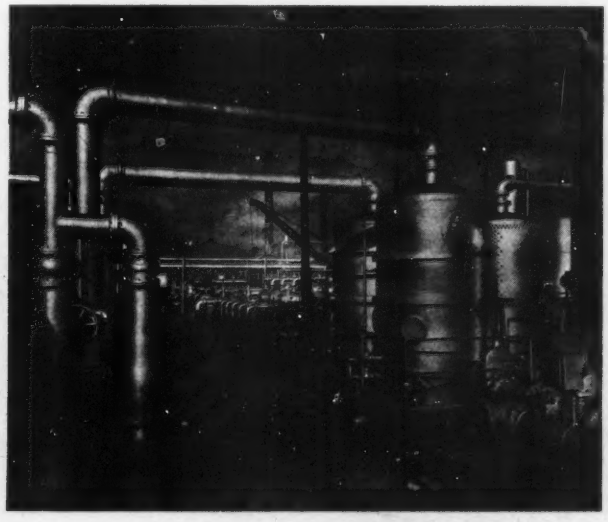
Some companies have installed, and others are giving serious consideration to the installation of forced draft cooling towers, in order to reduce the sizes required. In spite of whatever expensive design is used however, climatic conditions still play the most important role. Engineers attempting to decide both the required heat transfer area as well as cooling tower capacities for an absorption plant, in the face of this situation will always look upon an unfailing cheap supply of relatively constant low temperature water, which can be passed through the plant and then discarded, as the design Utopia.

Choice of Cooling System at Wilmington

A somewhat unique situation, as far as oil fields generally in California are concerned, existed at Wilmington in regard to cooling water when plans were inaugurated for the construction of an absorption plant there about two years ago. An unlimited supply of salt water was available for plant cooling purposes from the Cerritos Channel, approximately one-half mile south of the site of the proposed plant. Lying about 2000 feet northwest of the plant site was another channel with favorable topography for discharging the water. Although the use of ocean water for cooling was by no means a new innovation, since it has been used for years by several power companies up and down the coast, as well as in absorption plants with cooling towers, nevertheless its use in the entire cooling system of a natural gasoline plant presented several new problems and a necessity for a recapitulation of the advantages which might be expected from its utilization.

Significant amongst the benefits of sea water cooling, from an operating standpoint, was the fact that this water seldom exceeded 70°F. in temperature even in the warmest periods of the year, and thus guaranteed the plant freedom from climatic conditions insofar as cooling water was concerned. This was especially important at Wilmington where adverse humidity conditions are a serious factor since the cooling of water by means of cooling towers is accomplished mainly through the evaporation from the film surface of the water spray, and only to a small extent by means of conduction and radiation. Peak relative humidity conditions of 65% with wet bulb temperatures of 75°F. at Wilmington precluded the possibility of maintaining absorption oil temperatures or raw gasoline distillate temperatures, with cooling tower operation, within 10°F. of the temperatures when operating with

Sea water outlet and classifying tank in plant.



Sea water inlet piping to coolers and gas scrubber piping to compressors.

ocean water cooling. Taking the case of a typical plant in the Los Angeles Basin as an illustration of the magnitude of the savings possible from this source, it is indicated that extraction costs per gallon of natural gasoline recovered, in terms of additional fuel consumption only, increase 0.025c per gallon for an increase in lean oil temperatures of 10°F. when attempting to obtain equivalent extraction efficiency. Extending this to an estimated 50,000 gallons per day natural gasoline production for the Wilmington Plant it was indicated that daily savings of $12.50 per day should be realized in the warmer season of the year because of the lower temperature of the ocean water.

Another attractive financial consideration for continuous sea water cooling versus a fresh water cooling tower system would be in the saving in water makeup expense. It was indicated that the cooling system at Wilmington would have to remove 58,000,000 B.t.u. per hour when treating 40,000 M cubic feet of gas in the plant, which would require a water circulation of approximately 5,000 gallons per minute. With expected water makeup for a cooling tower being approximately 2% of the circulation, there would be a water purchase of 3,400 barrels per day required. Since the cost of fresh water approximated 0.5c per barrel, the expense of this water purchase would have been in excess of $6,200 annually.

From a design standpoint several considerations favoring a continuous ocean water cooling system were apparent also, in addition to the previously mentioned factor of lower maximum temperatures which would permit a conservative estimate of cooling surface. The lower maximum operating temperatures figured for the design, allowed for the boiler capacity as well to be held at a minimum, since provision for higher oil circulation rates did not have to be considered. Piping was considerably simplified because of the centralized arrangement possible without cooling towers. In addition, although the continuous ocean water cooling system requires the more expensive closed, forced circulation, type of coolers and condensers throughout the plant, rather than the atmospheric type commonly used in cooling towers, nevertheless the higher overall heat transfer rates for the closed type sections reduces the surface required and thus does not unfavorably affect the capital cost of the plant.

Debiting the expected tangible benefits calculated for ocean water cooling, however, was of course the expense which would be necessitated for installing corrosion resisting materials at points subject to rapid deterioration by the destructive action of the salt water. A complete study therefore was necessary to evaluate the cost of providing for the minimizing of corrosion, as well as the system fouling by various types of marine growth. Solution of these problems was considerably aided by examining the results of the power companies using salt water cooling systems.

It was estimated that the additional capital cost of the sea water system as necessitated by the expense of corrosion inhibiting would be acquitted in a few months by the tangible savings realizable. This prediction has been verified in the light of the results of the past year and a half that the system has been in op-

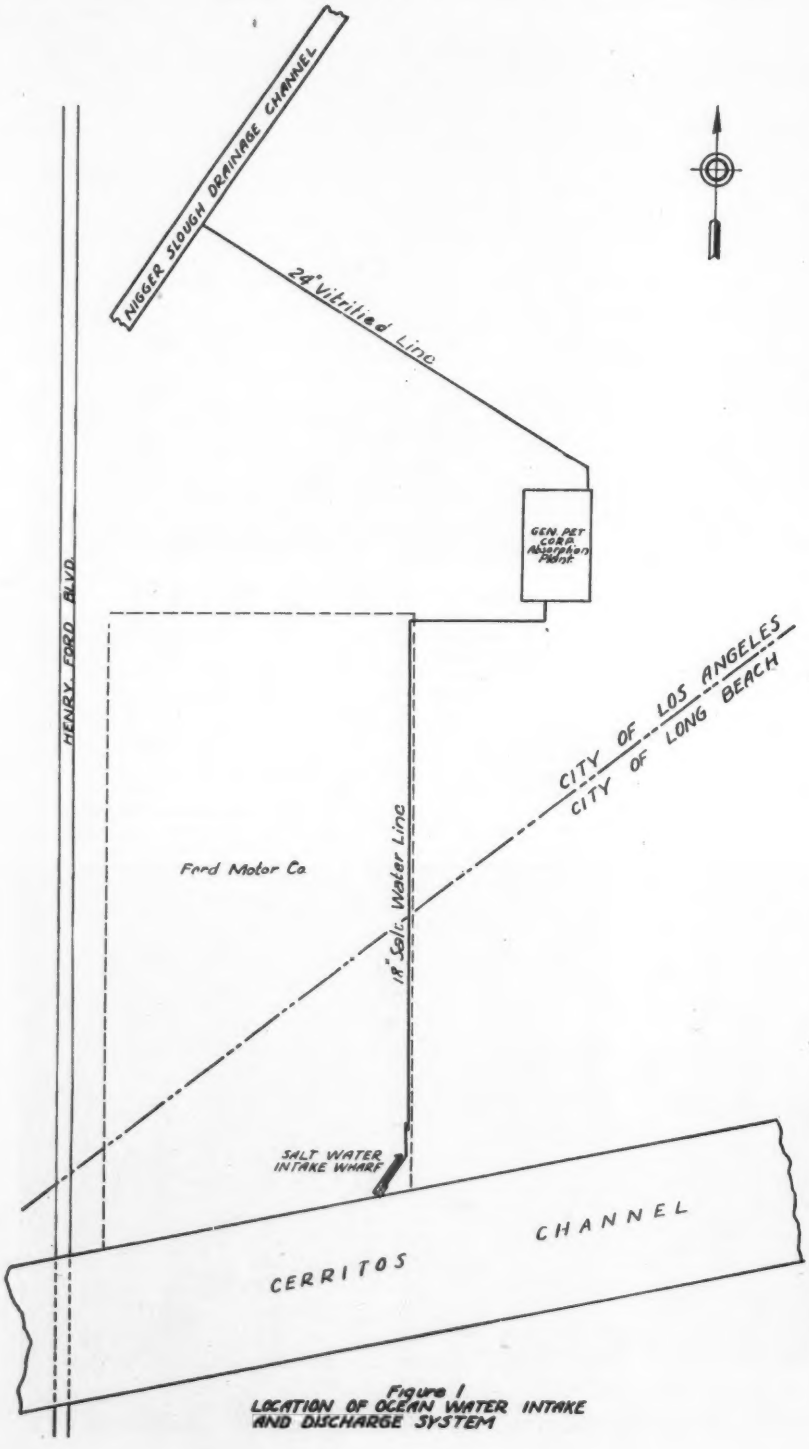
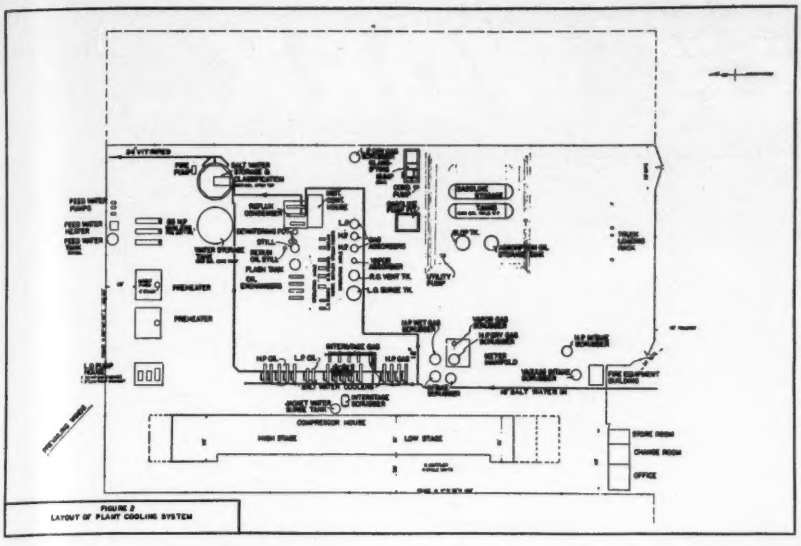


Figure 1
LOCATION OF OCEAN WATER INTAKE AND DISCHARGE SYSTEM

Sea water circulating pumps and piping on wharf.



eration. In the following description of the cooling system which was installed, the manner in which the pitfalls of ocean water cooling were minimized will be described in more detail.

Layout of Cooling System

Reference to Figure 1 will indicate the location of the plant with regard to the water intake and discharge pipelines. The Cerritos Channel from which the water for the plant is drawn, is a long narrow canal-like bay, approximately a quarter of a mile wide and used chiefly for the passage of barges, freighters of various sizes, and other small maritime craft.

The intake water pumps for the cooling system are mounted on a wharf which extends about 75 feet out into the water to where it reaches a depth of approximately 30 feet below mean low tide. Three deep well two stage turbine pumps serve for the circulating units, each pump being rated for the delivery of 2500 gallons of water per minute at heads of 85 feet and 1460 RPM. Two of the pumps are driven by 75 H.P. electric motors while the third is driven by a 100 H.P. internal combustion gas engine, direct connected through a gear head with a ratio of 2¼ to 1. Construction of two of the pumps is of the so-called non corrosive type, with bronze bowls, impellers and bearing retainers, and with the shafts made of monel metal; the remaining pump has high silicon steel impellers instead of bronze, metal sprayed bowls, and a stainless steel shaft.

The discharge head of the pumps is approximately 15 feet above mean low tide, while the bottom of the pump bowls extends about 4 feet below the surface of the water. An individual steel suction casing, approximately 28 inches in diameter, encircles the pumps and extends about 12 feet below the surface of the water, or about 14 feet from the bottom of the channel. At the bottom section of the pump casing a double set of strainers are provided, the features of which will be noted in detail later.

Water from the pumps is discharged into a double header consisting of two 14 inch O.D. 7-gauge spiral-welded steel pipes, which extend for a distance of approximately 300 feet and then branch into a single 18 inch O.D. 7-gauge spiral-welded steel pipeline. At the terminal end of the 14 inch sections the water is screened before passing into the larger diameter pipe. The double 14 inch diameter lines were provided in order to have a high water velocity prior to screening, for the purpose of minimizing barnacle accumulation on the interior of the pipe, and also to permit the cleaning of one line and filling it with fresh water until the other is fouled and ready for cleaning.

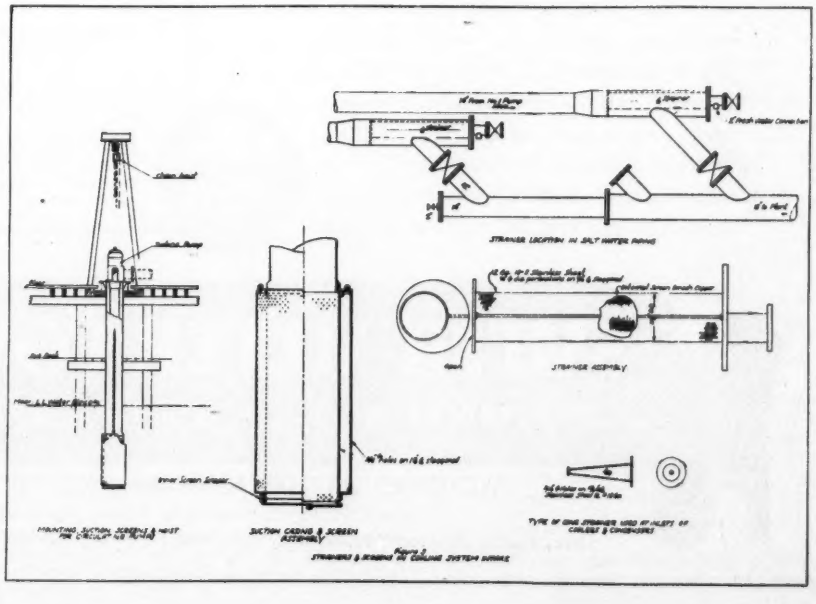
The 18 inch O.D. spiral-welded pipe then carries the entire water stream into the plant, a distance of 2700 feet. Figure 2 indicates the diagrammatic arrangement of the plant with reference to the cooling system. As will be noted, the high pressure gas coolers, jacket water coolers, oil coolers, and interstage gas coolers are located along the main branch of the salt water line. One branch of the salt water line tees off at right angle to the main header and the water, after being screened, goes to the gasoline condensers and coolers located on a platform adjacent to the still. The water circulated through the plant coolers and condensers then is discharged through a weir box, which measures the rate of flow, and then falls into the outlet tank.

The outlet tank, which has a capacity of 1000 barrels, is built with an upper separating chamber by means of which any oil contamination or other pollution is separated and then classified. Efficient classification of the water is provided in order to abide by Fish and Game Commission Regulations which forbid the discharging of water into the channel contaminated with oil, or polluted with substance of any kind detrimental to marine life. Permissible oil contamination is set at a maximum of 5 p.p.m. in suspension, and in addition no observable fluorescence on the surface of the water, which limits the oil film that might settle out to a concentration of less than 1 p.p.m.

The clean water in the outlet is then gravitated from the plant through a 24 inch vitrified sewer line into a drainage canal approximately 2100 feet northwest of the plant. A ten foot elevation head exists between the bottom of the discharge tank and the water outlet, which, coupled with an operating level of about 5 feet that is maintained in the tank, provides sufficient pressure to keep the water drained from the tank.

Keeping a minimum level of 5 feet of water in the discharge tank serves another purpose, namely, an emergency supply of water in case of fire or water circulation interruption. In the event of the latter the system is arranged to permit the return pumping of the water in the discharge tank to the vapor condensers until the plant can be shut down, thus preventing the discharge of dangerous vapors in the plant area. Provision for minimizing the possibility of water circulation interruption, however, is maintained by a pressure switch on the main water line, which by sounding a horn and setting a warning light when circulation drops to the set minimum, allows the operator to start another pump, which can be done from the control house in the plant.

It should be noted that while all cooling in the plant is done with ocean water, circulation through the compressors



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and auxiliary engine jackets is maintained with fresh water. This latter operation is carried out by a closed jacket water cooling system with heat exchange to the ocean water by means of coolers. Since only a small quantity of fresh water has to be maintained in this system, accurate chemical control of the jacket water is economically practicable. Careful attention to this water is paid by frequent analyses, and corrosion inhibiting is maintained by keeping a concentration of 240 p.p.m. of sodium dichromate, with the addition also of soda ash for Ph control on the alkaline side.

Corrosion Protection of Circulating Equipment

Ocean water is composed in the main as follows:

Calcium sulphate,	1200 p.p.m.
Magneisum sulphate,	2200 p.p.m.
Magnesium chloride,	2400 p.p.m.
Sodium chloride,	29,100 p.p.m.

As is well known, it is a very good electrolyte or conductor of electricity, hence electrochemical corrosion or the so-called galvanic action takes place with great rapidity in its presence. Electrochemical corrosion can be briefly explained as a solution of a metal in water accompanied by a flow of electricity; each metal having a definite solution pressure which is measured by the electrical potential which must be applied in order to prevent any action when the metal is immersed in a solution of one of its salts of a given concentration. Metals are usually arranged in a series with respect to decreasing solution pressure; potassium, sodium, barium, strontium, calcium, magnesium, aluminum manganese, zinc, cadmium, iron, cobalt, nickel, lead, tin, hydrogen, bismuth, copper, antimony, arsenic, mercury, silver, palladium, platinum and gold. Thus when two dissimilar metals are in an electrolyte in the presence of one another, the one higher in the series is said to be anodic to the metal lower in the series which then in turn is cathodic to the other; the anodic metal having a higher solution pressure will therefore go into solution and the other will not be attacked.

This phemonenon is the cause of most of the corrosion problems confronted as well as the basis of the corrosion protection of the more expensive equipment in the salt water circulating system where iron or steel is in contact with brass or bronze. Iron being anodic to copper will be readily attacked, and thus in order to protect the iron, varying size zinc plugs which are anodic to iron have been installed, giving protection by their self-sacrificing action until they are dissolved, and then must be replaced. Points in the system where zinc plug protection is used are in the bowls of the bronze constructed pumps in order to protect the steel shafts, and also in the entrance and exit channels of the cast iron shell coolers and condensers because of the bronze tube sheets and brass tubes.

Screens and sediment blowoff connections.

Air, or more exactly oxygen, greatly accelerates electrochemical corrosion, since it acts as a depolarizer and removes the products of corrosion. In order to minimize the effect of oxygen, air eliminator traps have been installed at the inlet water channels of the coolers where the excessive turbulence tends to throw the air out of solution. Further protection is afforded at this point by a protective paint coating, the most satisfactory on the basis of several tests to date being a three coat marine antifouling application. The surface is prepared very carefully, and thoroughly dried, then first, a chromated bakelite type of iron oxide primer is applied, secondly, a ground coat with a corrosion inhibiting agent, and lastly, a coat of anti-fouling paint of the iron oxide type containing mercuric or cuprous oxide as an anti-fouling agent. Properly applied this type of protective coating is effective for periods of about one year.

The choice of metals used in the salt water system obviously had to be made on the basis of price as well as corrosion resistivity. Economic considerations prompted the trial of cast iron impellers on the first circulating pump, but the rapid wear of this type impeller necessitated its replacement with a high silicon steel runner. The latter has given satisfactory service but on later installations all-bronze construction has been specified, since the price differential for this material has nevertheless been indicated to be warranted. Tubes in the coolers and condensers, through which the sea water circulates, are made of both admiralty metal (copper 70%; zinc 29%; tin 1%) as well as yorcalbra (copper 76%; zinc 21¼%; aluminum 2¼%). The experience of those operating marine cooling systems has indicated that the expected life of cup-drawn 18-gauge admiralty tubes in this service is 50,000 service hours, failure occurring usually at the inlet end from the greater turbulence. Yorcalbra tubes which cost approximately 25% more than admiralty have been said to have two or three times the life of the latter in salt water service.

Inspection of the tubes in the plant coolers to date has shown but little difference in the results of the action of the water on the admiralty and yorcalbra tubes. Practically no evidence of abnormal wear or localized corrosion is shown by either type of tube. Credit for this efficient service must be laid to a great degree to the fact that the water is screened immediately before entering the coolers. This is done to remove any shells or other foreign matter in the water and prevent it from lodging in the tubes. A piece of shell stuck in a tube would cause an area of violent turbulence, which would set up a localized anodic region because of the fluctuating polarity, and thus result in rapid failure of the tube.

Due to the fact that corrosion takes place with greater rapidity in areas of greater stress, as well as to the fact that welds to some extent contain dissimilar metals, very close attention is paid to the spiral-welded steel pipeline transporting the water to the plant. Inspection to date shows some localized corrosion or pitting, but on the whole no rapid deterioration. Because of these results, it has not been deemed necessary as yet to institute protective measures to inhibit the corrosion of these lines. In the future it is considered possible that cathodic protection may have to be resorted to; an insulating flange in that event would have to be installed at the entrance to the plant in order to prevent the applied current from entering that area and creating a fire hazard. This restriction, therefore, would limit the transmission lines to the plant only to the benefit of cathodic protection against corrosion.

Fouling and Pollution Protection For Cooling System

The problem of minimizing the accumulation and growth of marine life in the cooling system is the most important operating consideration with which it is necessary to cope in order to maintain a satisfactory circulation of water with the least expenditure of energy. The cooling system was therefore planned with a view to preventing as thoroughly as possible the infilteration of marine growths or other foreign matter. For this purpose strainers and screens were carefully designed and installed in accessible places to afford convenient cleaning.

Reference to Figure 3 will indicate the essential construction details of the various strainers and screens used, and the general location in the cooling system. Prior to entering the bowls of the pumps the water is strained through a double set of strainers constructed of 3/16" steel plate with ¾" diameter perforations. The inner strainer is joined as an integral part of the pump casing, while the outer strainer is movable vertically, being suspended by chains for this purpose. Knife edge scrapers are attached to the inside of this outer strainer and held by means of springs against the inner strainer, which thus permits the cleaning of the latter simply by raising the chains supporting the outer strainer.

Foreign matter passing through the strainers is removed after discharge through the pumps and before passing into the main line to the plant. As previously noted this is done at the junction of the double pump discharge header lines into the main large diameter transmission line to the plant. Construction of these latter screens is indicated clearly in Figure 3, and consists essentially of a six foot long stainless steel perforated internal strainer with ¼" holes, inside of which is inserted an 8-mesh copper screen. The internal strainers are mounted to flanges which permit easy removal and washing to free them and the internal screens of the accumulation of marine substances.

In the lower right hand corner of Figure 3 may be seen the type of check

screen used at the entrance to the coolers to prevent shells or other material from passing through and clogging the tubes, or which might set up localized areas of excessive turbulence in the tubes and accelerate corrosive action. Very little accumulation is generally caught on these cooler check screens; usually only marine growths which have lodged in the lines and later broken loose after attaining increased size.

Marine growths which prove the most troublesome in controlling, besides various types of algae growths, are some of the higher forms of marine life such as barnacles, pea clams, tubular coral and forms of string mosses. Unfortunately, from a cooling water operation standpoint, the still water of the Cerritos Channel serves as an excellent breeding place for clam and barnacle growth. These animals as well as the other marine life mentioned however, are abundant only in the summer months, as their prevalence appears to be a direct function of the temperature of the ocean water. Below 65° F. very little accumulation of this material is caught on the water screens. As will be noted in Figure 4, which indicates the average temperature of the water to the plant through the year, fouling problems are of considerable consequence in July, August and September, and screens must be frequently cleaned of an abundance of clams as well as other growth.

Despite the thorough screening measures employed on the water at the entrance to the cooling system, some incrustation of parasitic growth, particularly slime and algae accumulation, cannot be prevented from coating the inside of the lines, thus giving small clams or barnacles which might pass through the screens, an opportunity to attach themselves and grow to troublesome sizes. Seedling clams, small enough to pass through the 8-mesh screens, attain a size of about one inch in diameter in less than thirty days. Besides mechanical methods of removal, very little can be done to prevent the clams and barnacles which cling to the inside of the lines from growing because of Fish and Game Commission Regulations, already mentioned, that prohibit the pollution of any body of water with material detrimental to fish or animal life. This rules out most of the common and cheap chemical means of fouling protection, such as heavy metal salts, as well as high dosages of chlorine.

Chlorine, however, charged into the system in concentrations below 2 p.p.m. is almost thoroughly eliminated from the water by the time it reaches the discharge canal, and can be employed for desliming and control of algae growths. The use of chlorine periodically in this concentration gives favorable results at Wilmington, but great care must be employed in charging it into the system, which is done at the discharge of the pump. The addition of chlorine in the salt water lines adds to the corrosive possibilities to a much greater degree than in the conventional fresh water cooling systems because the high concentration of alkaline salts in treated cooling tower water readily takes the chlorine into solution, forming sodium hypochloride or neutral sodium chloride. The lower Ph of ocean water, on the other hand, does not readily absorb and neutralize chlorine, hence the chance of attacking metal is greatly increased. In order to obtain more accurate control and prevent overdosages, some power companies employ a patented process of using chlorine, by adding it to an open stabilizing tank containing granular limestone, and then intermittently discharging the solution into the salt water circulating pump. Because of the smaller quantities of water handled, as well as the fact that very little chlorine is used, the expense of this type installation has not been indicated to be justified for the Wilmington Plant.

The use of chlorine, even in very high concentrations, has very little effect on the higher forms of marine life such as barnacles, clams, tubular coral, etc., for these growths, as has been said previously, appear to be mainly affected by ocean water temperature and water velocity. Studies made prior to the design of the cooling system at Wilmington, showed that the collective experience of power companies using ocean water was to the effect that barnacles could not cling to the walls of lines in which velocities were maintained in excess of 3.5 feet per second. The choice of pipe sizes for the water transmission lines throughout the plant system was therefore carefully considered in order to exceed this minimum velocity. Velocities through the pump discharge headers are maintained from 6.5 to 11 feet per second, while through the main transmission header the water velocity is held between 4 and 7 feet per second.

Conclusion

In concluding these remarks on the subject of ocean water cooling in absorption plant operation, it is believed advisable to point out that this type of plant design is presented, not with the idea that it represents a procedure which can find wide application in the natural gasoline industry, but rather for its possible interest as an illustration of how manufacturing methods can be varied in order to utilize natural conditions to the best advantage and efficiency. It is hoped that this brief presentation of the design and operating plan of the Wilmington Plant sea water cooling system will prove of value to others who might find themselves faced with conditions favoring a similar installation.

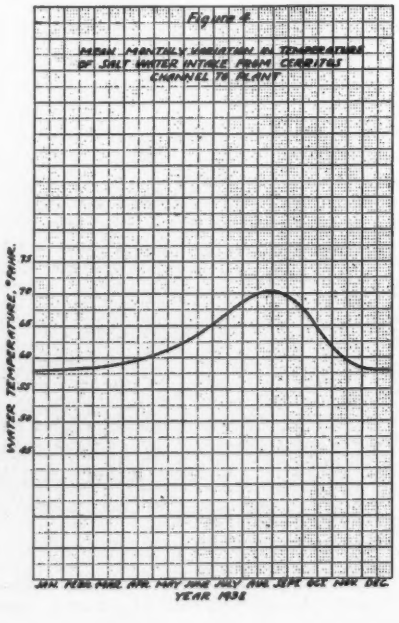
Figure 4
MEAN MONTHLY VARIATION IN TEMPERATURE OF SALT WATER INTAKE FROM CERRITOS CHANNEL TO PLANT
WATER TEMPERATURE, °F.
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
YEAR 1938

R. H. Pierson

Chief Chemist, Gilmore Oil Co.

In publishing the article, "Asphalt Production and Many Applications," in the first issue, January, 1939, the California Oil World failed to credit the author, R. H. Pierson, who presented the paper at the January meeting of the California Natural Gasoline Association under the title, "Asphaltic Products from Petroleum."

Report on API Pump-Performance Experiment, M. G. Arthur and E. K. Parks. Abstract: This paper describes the procedure and results of an American Petroleum Institute cooperative experiment on reciprocating-pump performance, conducted in an effort to show the influence on liquid pumped of such factors as: 1, fluid head on the standing valve; 2, viscosity; 3, velocity through the standing valve; and, 4, size of standing-valve opening, and size and length of any tubes leading to the standing valve. It is stated that results of the test indicate that no serious loss of efficiency should be found in practice unless the proportions of sound design are disregarded, such as attempting to pump very viscous liquid at high speed with low fluid head.

Enforcement of the California law prohibiting the sale of gasoline at prices lower than those posted on pump and dispensing apparatus is regarded by Attorney General U. S. Webb as a duty.

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1939
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G. H. Forster

W. W. Orcutt

V. H. Kelly

High Executive Changes In Union Oil Personnel

At a meeting of Union Oil Company's board of directors W. W. Orcutt, vice-president in charge of production, and George H. Forster, comptroller, announce their retirement effective Dec. 31, 1938. At the same meeting V. H. Kelly, director of sales, and A. C. Rubel, director of production, were elected vice presidents, and M. G. Kerr, assistant comptroller, was elected comptroller.

W. W. Orcutt received his early education in Santa Paula, Calif., and became associated with the company in 1898. He is a member of the first graduating class of Stanford University, and was the founder of Union Oil Co.'s geological department, the first of its type to be organized in the United States. The town of Orcutt was named in his honor, and he is widely known to the oil industry as the "Dean of Petroleum Geologists." For his contributions to the science he was in 1926 awarded an honorary membership in the American Petroleum Association. In 1900 W. W. Orcutt made the original discovery of fossil remains in the Brea beds on the Hancock ranch in Los Angeles, from which have since been taken for museums in all parts of the country, skeletal remains of many prehistoric animals. He is the oldest employee of the company in point of service, having completed his fortieth year of association in May 1938. He will continue as a member of the board of directors.

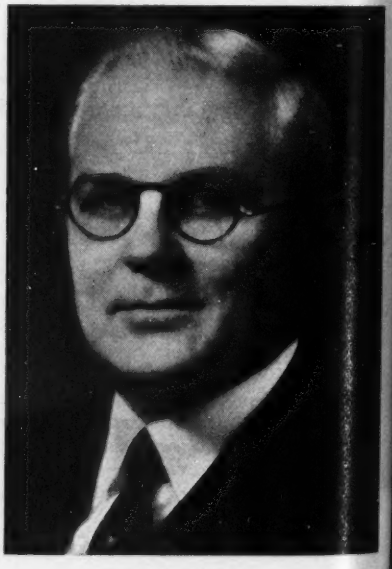
A. C. Rubel

George H. Forster began his services with Union Oil Co. in 1913, and has been comptroller for the past nine years. He has been largely responsible for shaping the accounting policies, not only of the company, but of the industry generally.

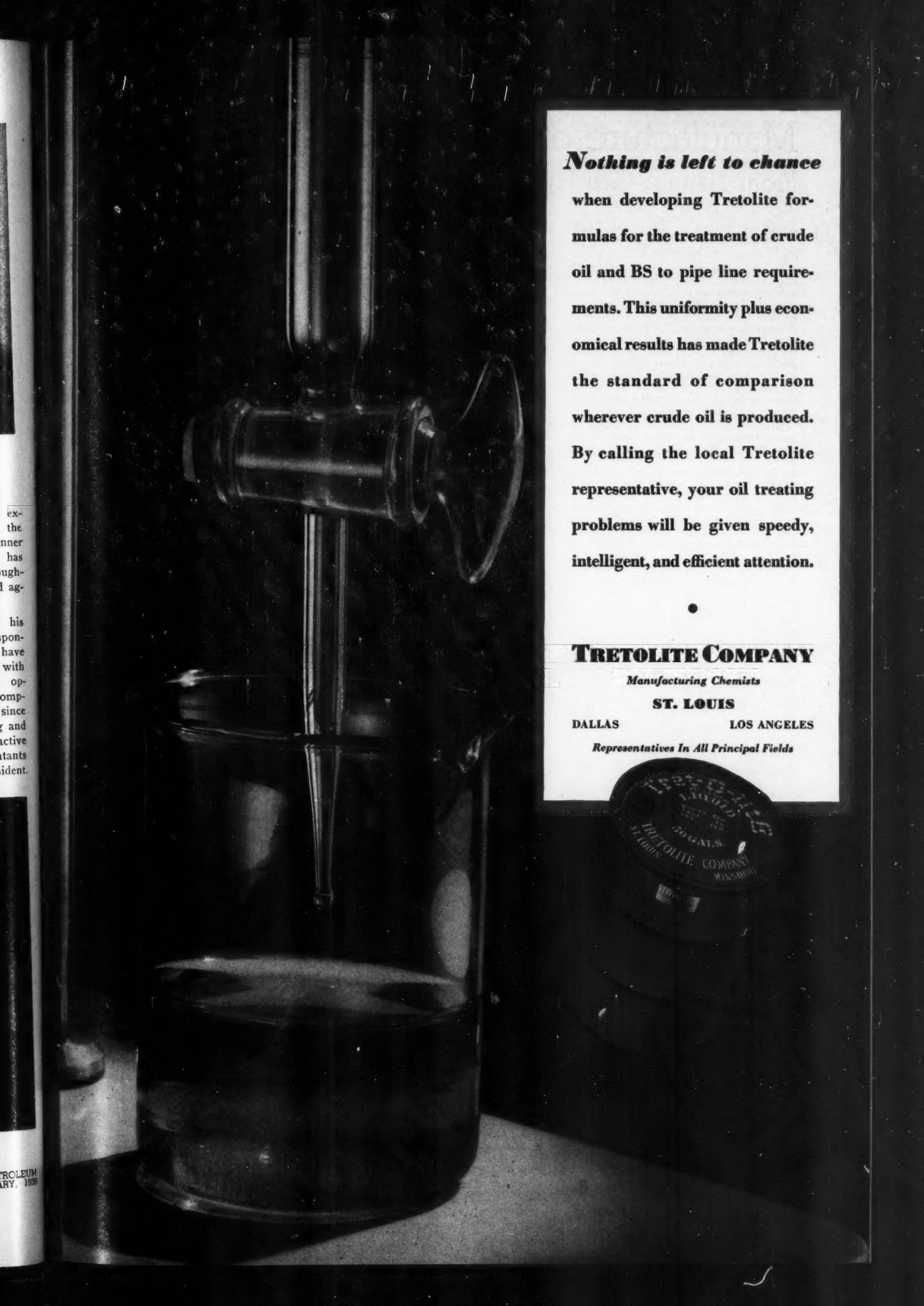
V. H. Kelly first joined the sales force of Union Oil Co. in Tacoma in 1913, and established himself early as a capable sales executive. He was for many years occupied in various managerial positions in the northwest, and first came to the Los Angeles office as chairman of the company's sales committee in 1929. Two years later he was appointed director of sales, in which capacity he has remained until the present time.

A. C. Rubel has been director of production since May, 1936. His initial employment dates from 1923, during which, beginning as a geologist and petroleum engineer, he has steadily risen to his present position. He has directed the exploratory and drilling activities of the company in a highly successful manner during the past three years, and has acquired an enviable reputation throughout the industry as a resourceful and aggressive production executive.

M. G. Kerr has progressed to his present post through a series of responsible accounting positions that have brought him into intimate contact with almost every phase of company operation. He was elected assistant comptroller in December, 1934, and has since alternately had charge of operating and financial accounts. He is also an active member of the Petroleum Accountants Society, of which he is a past president.



M. G. Kerr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Manufacture of Organic Chemicals

From Natural Gas Hydrocarbons

By Robert E. Vivian

Associate Professor, Chemical Engineering, University of Southern California

In this paper we shall survey the chief organic compounds that are now being manufactured in commercial quantities from the hydrocarbons found in natural gas and some of those compounds that may soon be produced from that source. The discussion of this interesting and rapidly developing field of synthetic organic chemistry will be given in terms of elementary chemistry for the benefit of those men in the natural gasoline industry who have been away from college for many years.

In former years, when synthetic organic chemistry was mentioned, everyone thought immediately of the coal-tar industry with its multitude of organic compounds derived directly or indirectly from coal-tar and widely used for dyes, explosives and drugs. But now the chemist begins to realize that petroleum and natural gas may soon be the sources of just as many organic chemicals as were ever made from coal-tar.

The old organic text-books discussed the chemistry of the aliphatic or straight-chain hydrocarbons with almost as much detail as was given to the aromatic or benzene-ring hydrocarbons, explaining their various families or groups, and how organic compounds could be made from them by reaction with chemicals such as sulfuric acid, caustic soda and chlorine. But our teachers pointed out to us that many of these reactions were only of scientific interest and had no commercial practical value. For example, the series of oxidation products derived from methane, CH_4, the chief constituent of natural gas, were given as follows, in order of increasing oxidation:

1. methyl alcohol—CH_3OH or CH_4O.
2. formaldehyde—H-CHO or CH_2O (with one H_2O removed in the process).
3. formic acid—H-COOH or CH_2O_2.
4. carbon dioxide—CO_2 (and another H_2O removed).

This oxidation series gave an excellent means of showing the relation of these compounds to each other and the fact that the end products from any complete oxidation of hydrocarbons would be carbon dioxide and water, but practically methyl alcohol, formaldehyde and formic acid were not made in that manner because oxidation could not be controlled. Instead of obtaining these desirable and valuable organic compounds it was found that partial oxidation of methane gave carbon black or soot and water vapor, while complete oxidation gave carbon dioxide and water vapor. It was true that occasionally experimenters found very small amounts of formaldehyde and other products in the gases formed by incomplete combustion of methane or natural gas, but the yields were too small to be of more than scientific interest.

Many years ago, while teaching in the Junior College at Bakersfield, California, the author tried many experiments on oxidation of natural gas in the endeavor to make methyl alcohol or formaldehyde from it and arrived at the same conclusions as given above. In those days of the oil booms at Santa Fe Springs and Signal Hill the author worked in the oil fields and noted the tremendous quantities of gas wasted and thought it would be a great thing to convert the methane to methyl alcohol and thus be able to store it as a liquid. Later he discovered that better men than he had been working on the same idea and abandoned it.

The old organic chemistry texts gave many compounds that might be made from ethylene by chlorination, sulfation, hydrolysis, etc., but we found that commercially many of these compounds were not made this way, but from ethyl alcohol. It was only in recent years when cracking processes for petroleum refining became more important and furnished large amounts of ethylene, that ethylene itself was obtained commercially otherwise than by dehydrating ethyl alcohol.

Acetylene was one of the few hydrocarbons not derived from coal-tar that had really been put to work for chemical manufacture up to 1920. The World War and its demands for acetone for powder manufacture had stimulated the introduction of the acetylene process by Shawinigan Chemical Company in Canada and by other companies in Europe. Other organic chemicals were soon manufactured from the same source and will be discussed later in this paper. But, although acetylene can be made from natural gas, it was made in Canada then and now from electric furnace calcium carbide.

So up to recent years the hydrocarbons of natural gas had been used almost entirely for fuel, and as a subject of theoretical interest only for synthesis in organic chemistry. Today, millions of gallons of alcohol, aldehydes, organic acids and esters are derived directly or indirectly from these hydrocarbons. What then has produced this great change and how has it been brought about?

Reasons for Slow Development in Past

There have been many difficulties to be overcome before synthetic organic chemicals could be made from petroleum and natural gas hydrocarbons. Some of the main difficulties were:

1. The complexity of the hydrocarbons found in petroleum and natural gas. (See Table 1). It should be noted that there are several different series of hydrocarbons, classified according to the ratio of carbon to hydrogen existing in them. The first series has the general formula of CnH (2n+2), in which "n" stands for the number of carbon atoms in the formula. This series is known as the methane or paraffin series and is said to be "saturated", since all the carbon atoms have all the hydrogen they can take. The other series are said to be "unsaturated" whenever there is a double or triple bond between the carbon atoms, for they can take more hydrogen (or other elements such as chlorine) if given the opportunity. Ethylene has a double bond as shown in Table 1 and can take on two hydrogens to form the saturated ethane. Acetylene has a triple bond and so is more highly unsaturated than ethylene. It can take on four hydrogens to form the saturated ethane of the paraffin series. This explains partially why acetylene is so much more reactive than ethylene

Table *1

Classification of the Hydrocarbons

Name of Series	Methane or Paraffin	Ethylene or Olefin	Acetylene	Terpene	Benzene	
General Formula	$C_nH_{(2n+2)}$	C_nH_{2n}	$C_nH_{(2n-2)}$	$C_nH_{(2n-4)}$	$C_nH_{(2n-6)}$	Etc., up to $C_nH_{(2n-20)}$
Examples	CH_4 Methane	—	—	—	—	—
	C_2H_6 Ethane	C_2H_4 Ethylene	C_2H_2 Acetylene	—	—	—
	C_3H_8 Propane C_4H_{10} Butane	C_3H_6 Propylene Etc.	Etc.	— C_4H_4, etc.	— — — C_6H_6, etc.	
	Etc to $C_{60}H_{122}$	Naphthenes or Cyclo-Paraffins Cyclo-butane	Diolefins Butadiene or Divinyl	Olefin-acetylenes		

and why ethylene is more reactive chemically than ethane, which is relatively inert, as are the rest of the paraffin series hydrocarbons. Petroleum is a mixture of hydrocarbons from all of the many series shown. Natural gas and natural gasoline are chiefly from the inactive paraffin series hydrocarbons. Table 2 shows the chief hydrocarbons found in natural gas and their physical properties. Note that as the number of carbons and hydrogens increase, that the complexity increases rapidly, even in this paraffin series, due to the formation of "isomers," compounds having the same number of carbons and hydrogen atoms, but in different space arrangements relative to each other. Methane, ethane and propane have no isomers possible but butane has one isomer, pentane has two and hexane has four. These isomers have the same molecular weight but different boiling points and different chemical reactivity. The olefin and other series of hydrocarbons can have their isomers also. So it can be seen that the chemistry of the hydrocarbons is somewhat complex.

2. Another reason for slow development in the field has been the difficulty in separating these complex hydrocarbon mixtures found in petroleum and natural gas in order to obtain pure hydrocarbons as raw materials for chemical industry. By looking at the boiling points of the hydrocarbons shown in Table 2, it can be seen that methane, ethane and propane can be readily separated by low temperature distillation at atmospheric pressure. They can also be separated by distillation at higher temperatures under higher pressures. Butane also can be separated from the rest by the same means, and even from its isomer, iso-butane, whose boiling point is about 10° C. (18° F.) lower. But pentane, the next hydrocarbon, has two isomers, and one has a boiling point within 8° C. (14° F.) of normal pentane. Hexane has four isomers, some of which have boiling points within 2° C. (3.6° F.) of each other, and so it goes, becoming increasingly difficult to separate the heavier hydrocarbons. Then, too, the heavier hydrocarbons may have olefins, diolefins or napthene hydrocarbons, with the same number of carbon atoms, and these also may have their isomers to make separation by distillation still more difficult. Some of these may be separated by selective solvents such as acetone.

3. The organic chemical field did not seem a large outlet for products to oil and gas company executives who were accustomed to sell their products in millions of gallons.

4. The oil and gas industry has had its own problems pressing for solution and has been making tremendous progress in its own particular field, which is a comparatively young one.

5. The organic chemical field was so completely outside the experience and thoughts of most oil and gas executives and sales managers. Benjamin T. Brooks in a recent article for Chemical and Metallurgical Engineering[1] points out that companies passed up ethylene glycol, made from natural gas, as a mere glycerine substitute and overlooked the manufacture of ethyl alcohol from ethylene, believing it to be uneconomical. Yet today millions of gallons of ethylene glycol and ethyl alcohol are being made from the hydrocarbons successfully.

6. New markets had to be developed for many of the organic chemicals that are now made from hydrocarbons. This takes time and money.

TABLE 2

THE LOWER MEMBERS OF THE PARAFFIN SERIES

Hydrocarbon	Formula	Melting Point ° C.	Boiling Point °C. at 760 mm.
Methane	CH_4	-182.5°	-164°
Ethane	C_2H_6	-183.6°	-84.1°
Propane	C_3H_8		-45°
Butanes	C_4H_{10}		
n-Butane		-139.0°	0.6°
isoButane		-145°	-10.2°
Pentanes	C_5H_{12}		
n-Pentane		-129.73°	36.06°
isoPentane		-160.5°	27.95°
Tetramethylmethane		-20°	9.5°
Hexanes	C_6H_{14}		
n-Hexane		-95.34°	68.70°
2-Methylpentane			62°
3-Methylpentane			64°
2:2-Dimethylbutane			49.6°
2:3-Dimethylbutane			49.5-50.5°

Taken from Dunstan, Science of Petroleum, Vol. II, p. 937. 1938

Reasons for Rapid Growth in Recent Years

There have been several reasons why this industry has recently developed rapidly.

1. The great increase in the use of cracking processes at oil refineries has resulted in a large production of olefin or unsaturated hydrocarbons as by-products. Since they are more reactive than the paraffin hydrocarbons, they are more readily used for chemical manufacture and such use has led to increased knowledge in this field.

2. Improvements in methods of fractional distillation, and in equipment for this purpose, have given purer hydrocarbons. Pressure fractionating columns now yield propane and butane of 98 to 99 per cent purity. This is excellent raw material for chemical manufacture.

3. The rapid increase in the number of well trained chemists and chemical engineers in the oil and gas industry.

4. The general public, which includes the oil and gas executives and boards of directors, are becoming more "chemical-minded" as they realize the success of chemical enterprises in this country and their steady and profitable growth. Therefore more "patient money" is becoming available for research and development.

5. There has been a steady increase in the fundamental knowledge of the organic chemistry, the physical chemistry and thermodynamics of the hydrocarbons. Such fundamental research work as that carried on at the University of Michigan, Massachusetts Institute of Technology and Pennsylvania State College in the East and at Stanford and California Institute of Technology in the West, is very much worth while and is bearing fruit.

6. Finally, there has been a large increase in the demand for organic chemicals such as those made from petroleum and natural gas, for use as solvents, anti-knock compounds, refrigerants and in the resins and plastics fields.

Chief Companies in This Field in United States

The chief companies now manufacturing organic chemicals from oil and gas hydrocarbons in this country are the Carbide and Carbon Chemical Company, Sharples Solvents Company, Standard Development Company and Standard Alcohol Company of the Standard Oil Company of New Jersey and the Shell Chemical Company of the Shell Oil Company in California. Several other oil companies such as General Petroleum Company and Standard Oil Company of California, are now manufacturing iso-octane for motor fuel and so might be considered to be engaged in this field of organic chemical manufacture also.

The Carbide and Carbon Chemical Company is usually considered to be the pioneer in this industry. The story of its development is very largely the biography of Dr. George Curme, its vice-president and director of research.[2] He began his research on hydrocarbons at Mellon Institute in Pittsburgh in 1914 for the Prestolite Company, endeavor-

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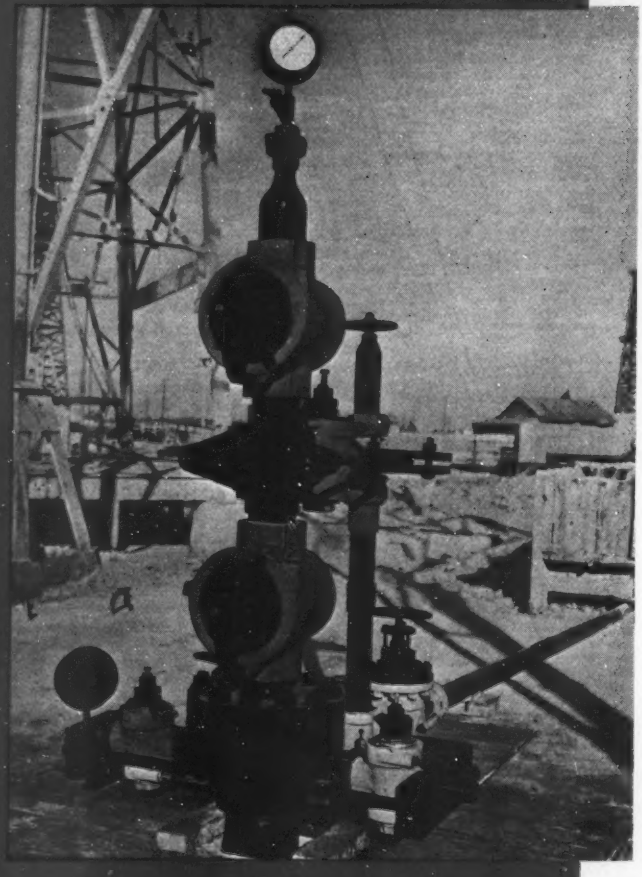

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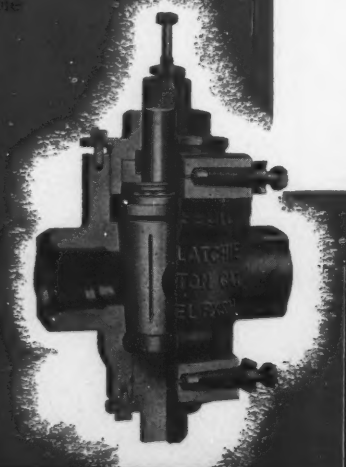

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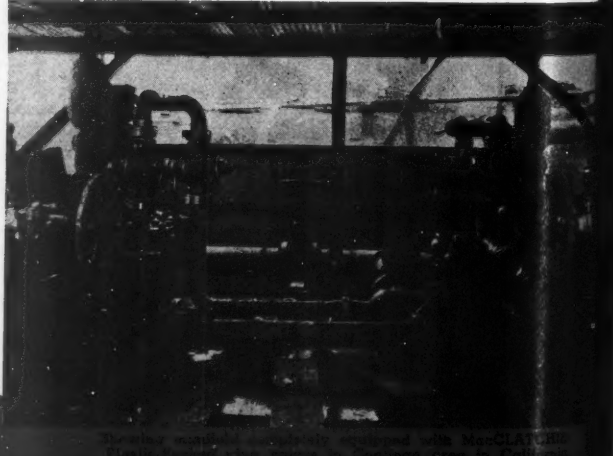

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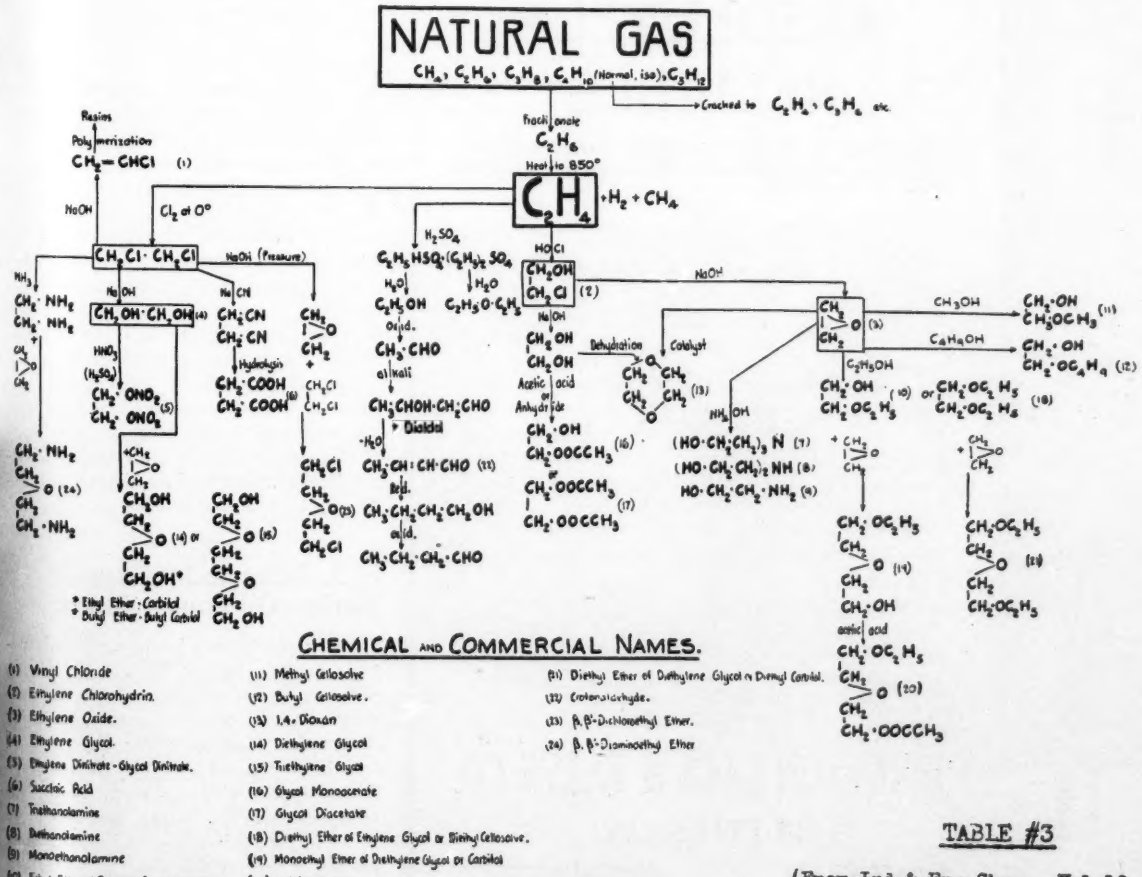
ing to make acetylene from other sources than calcium carbide. He found that if an electric arc was maintained below the surface of a mineral oil he obtained acetylene, but that he also got much ethylene, carbon monoxide and other by-products that had to be removed and utilized if the process were to be a success economically. This led to his working on ethylene and the manufacture of organic chemicals from it. When the Union Carbide Company took over the Prestolite Company in 1917, they were wise enough to see the value of his work and to support it with more money and research assistants. By 1920 he and his staff at Mellon Institute had developed several products made from ethylene which looked hopeful and had worked out the laboratory processes for their manufacture. Then in 1920 to 1923 came the necessary pilot plant work at a little factory near Charleston, West Virginia, where they had plenty of natural gas available from which to make their ethylene. Many months of hard work and long hours were needed to overcome their manufacturing problems, for even after careful small-scale laboratory work there seems to always be many new difficulties that crop up in such pilot plant or semi-commercial operations, as the writer well knows from many years of experience as a research chemist and development engineer for General Chemical Company. Finally, after the manufacturing problems had been solved, came the important problem of selling the products. This, too, proved difficult at first and new markets and new uses had to be developed. However, by 1925 Dr. Curme and his organization were in successful commercial production of organic chemicals from the hydrocarbons.

The first products marketed by the Carbide and Carbon Chemical Company, the subsidiary of the Union Carbide Company, were largely non-competitive organic chemicals which were new to the industry, at least in large quantities. They were ethylene glycol, ethylene chlorhydrin, ethylene oxide, ethylene dichloride, iso-propyl alcohol, di-ethyl sulfate and the trade-marked "Cellosolve." After these were safely launched upon the markets, Dr. Curme and his company turned to the more competitive organic chemicals and by 1930 they had developed processes for ethyl alcohol, acetone, etc., from the same hydrocarbon sources and soon successfully introduced them to the consuming markets. See Table 3—Organic Chemicals from Natural Gas.

A few years later this company built an extensive plant at Whiting, Indiana, alongside the large refinery of Standard Oil Company of Indiana. Here they secure the ethylene and other hydrocarbons they need for raw materials from the cracking-still gases which were formerly burned as fuel in the refinery. This saves the step in the process as used at Charleston, West Virginia, of pyrolysis or "cracking" of natural gas to make ethylene and other olefin hydrocarbons. At present Carbide and Carbon Chemical Company lists about one hundred organic chemicals which they manufacture from these sources and new ones are being added to the list continually, including alcohols, aldehydes, acids, glycols, ethers, amines, esters and synthetic resins. This is truly a great achievement in marketing as well as manufacturing and research.

The Sharples Solvents Corporation began production of amyl chlorides, amyl alcohols, and amyl acetates at Belle, West Virginia, in 1926, using pentane derived from natural gasoline as the fundamental raw material.[2] The products were used as high-boiling solvents for the lacquer industry. This company, too, has had its difficult problems to meet in manufacturing and marketing, but is now well established. Since it uses large amounts of chlorine in its primary process step of chlorinating the hydrocarbons, it has finally moved to Wyandotte, Michigan, near a large electrolytic alkali-chlorine plant. It is now producing organic chemicals from butane and propane as well as the original compounds from pentane. About thirty-five chemicals are in commercial production and approximately the same number of additional chemicals are produced on a semi-commercial or smaller scale.

The Standard Alcohol Company, set up by Standard Development Company of the Standard Oil Company of New



CHEMICAL AND COMMERCIAL NAMES.

(1) Vinyl Chloride
(2) Ethylene Chlorohydrin.
(3) Ethylene Oxide.
(4) Ethylene Glycol.
(5) Ethylene Dinitrate - Glycol Dinitrate.
(6) Succinic Acid
(7) Triethanolamine
(8) Diethanolamine
(9) Monoethanolamine
(10) Ethyl Ether of Ethylene Glycol Cellosolve.
(11) Methyl Cellosolve
(12) Butyl Cellosolve.
(13) 1,4-Dioxan
(14) Diethylene Glycol
(15) Triethylene Glycol
(16) Glycol Monoacetate
(17) Glycol Diacetate
(18) Diethyl Ether of Ethylene Glycol or Diethyl Cellosolve.
(19) Monoethyl Ether of Diethylene Glycol or Carbitol
(20) Carbitol Acetate.
(21) Diethyl Ether of Diethylene Glycol or Diethyl Carbitol.
(22) Crotonaldehyde.
(23) β,β'-Dichlorethyl Ether.
(24) β,β'-Diaminoethyl Ether

TABLE #3

(From Ind.& Eng.Chem., Vol.10, No.1, News Edition)

Jersey, has been established for several years at Bayway, New Jersey, near the company's large refinery. It uses ethylene and propylene from the cracking-still gases as the raw material for the manufacture of alcohols chiefly.

In California, the Shell Chemical Company, established through the research work of Shell Development Company, a subsidiary of Shell Oil Company, has been the pioneer in this organic chemical industry. Shell Chemical Company has three plants, a synthetic ammonia plant near Pittsburgh, California and two organic chemical plants. The original organic chemical plant was established at Martinez about 1930, near their large oil refinery. Then in 1936 the plant at Dominguez was built. Both plants operate on cracking still gases, which are fractionated to obtain a butane plus butylene cut and a propane plus propylene cut. The olefin hydrocarbons are absorbed in sulfuric acid and then hydrolyzed to alcohols under carefully controlled conditions. If propylene is used the product is chiefly iso-propyl alcohol with some iso-propyl ether as a by-product. From the propyl and butyl alcohols many other organic chemicals are derived including acetone and other ketones, acetate esters and ethers. These compounds have a good market as solvents in the paint and lacquer trade and have other uses. Iso-propyl ether, for example, is an excellent anti-knock compound to add to gasoline for high grade motor fuel such as is used in aviation.

The general factors of organic chemistry that underlie the developments described are too long for this paper, but will be discussed later. The processes used include pyrolysis, chlorination, selective absorption, hydrolysis, dehydration, oxidation, reduction, esterification and others. There have been entire books written on just one of these subjects.

This paper concludes by paying tribute to the chemists and chemical engineers with courage, vision and brains who have built up this industry, and to those executives and directors who have supported their efforts with the "patient money" necessary. This industry, whose production now has a value close to one hundred million dollars a year, is a true asset to our country in peace or war. Thus does research and development point the way to true prosperity.

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Clark, Lee, Chem. and Met. Eng., 38: 206-210. 1931.

The University of California Extension Division announces the opening of a course in Petroleum Technology on Wednesday evening, March 8, at 7 o'clock at its 815 South Hill street downtown Los Angeles headquarters. The course will stress the history, origin, geology and chemistry of petroleum and will include laboratory tests and a study of transportation and distribution, as well as other pertinent topics. The course will consist of 15 weekly meetings and will be followed by a second course of an equal number of meetings starting on May 17. The courses are open to everyone interested and will have as instructor Paul F. Devine, Assistant Supervisor in charge of Sciences and Mathematics for Los Angeles City Schools.

An advanced course in Practical Oil Geology with William W. Porter II, consulting geologist, as instructor will open at the state university's Extension Division headquarters in Los Angeles, Tuesday evening, March 14.

B. A. Munn to Manage Hacker Oil Supply Sales

The many friends in the California petroleum industry of Bernard A. Munn, will be pleased to learn of his appointment as manager of oil country sales for the Hacker Pipe & Supply Co.

It is anticipated that the Hacker Pipe & Supply Co. will, as a result of the appointment of Mr. Munn, become more active in the oil industry and negotiations are under way at this time to strengthen their sales personnel and to add additional lines to those now carried.

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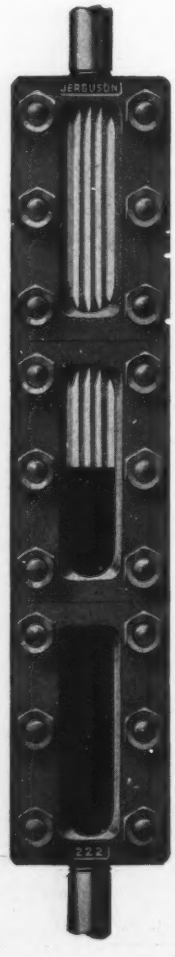

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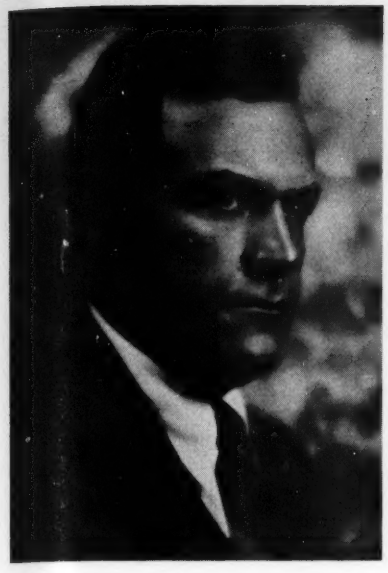

Frank Rehm

F. E. Rehm, recently elevated from Production Manager, resident in Los Angeles to Manager of Labor Relations Department of Shell Oil Co., San Francisco. Mr. Rehm, one of Shell's oldest production employes joined the concern in 1916, was sent to Ventura. He was made superintendent there in 1923. In 1926 he was transferred to the Los Angeles office and in 1934 was made production manager for Shell Oil. The new appointment was made effective as of January 1st. Mr. Rehm has already assumed his new duties in San Francisco. Harold T. Wyatt, formerly assistant production manager, has been appointed to fill the vacancy made by the appointment of Mr. Rehm.

Four Conditions Govern Location of Oil Deposits

So extensive are the oil reserves in the United States that it is popularly believed by many that oil can be found nearly anywhere beneath the surface of the earth. The successful drilling for oil, however, is governed by four general geological conditions; the absence of any of them making the venture unprofitable.

First, there must be in the region a source rock containing the necessary carbonaceous material from which the petroleum could be formed. The most common source rocks are the bituminous shales laid down by the sea. For some reason the shales formed by sedimentation in fresh water did not give rise to valuable accumulations of oil. This knowledge is of basic importance to the oil prospector, for it saves him from drilling in unfavorable rock formations.

But even if the rocks in the region are favorable to oil formation, there must be a reservoir rock where the oil can accumulate. Usually the reservoir rock is sandstone, which contains spaces between the particles ranging from 10 to 40 per cent of its volume. This porosity permits the oil to flow through the rock, which holds it like a sponge. Sometimes limestone and dolomite serve as reservoir rocks.

The third requisite for an accumulation of petroleum is a favorable structural arrangement of the layers of rock. Unless nature folded the rocks with the proper twists and pockets, the oil could not be trapped. The simplest form of geological oil trap is the anticline, an arching of the rocks. At first it was believed that this form of trap was the only type in which oil could be accumulated, but now more than a dozen kinds of rock traps are recognized.

The fourth condition for the accumulation of oil in commercial quantities is a cover of impervious rock over the reservoir to keep the vapors and volatile materials confined. Petroleum in the ground has a temperature considerably higher than the temperature of the air at the earth's surface, and if the petroleum was not tightly confined, the lighter substances would distill off.

California Standard Float Wins in Roses Tournament

The Grand Prize for the most beautiful float in the Pasadena Tournament of Roses parade January 2nd was awarded to the Standard Oil Co. of California's entry entitled "Romance of the Oil Industry."

This float depicted in flowers the first oil well drilled in California and the first California oil refinery. The state's initial well was drilled in Pico Canyon northwest of Newhall in 1875, the first refinery having been built in Railroad Canyon one half mile from the town of Newhall in 1876. Both of these pioneers were the property of the California Star Oil Works Company, direct ancestor of the present Standard Oil Company of California. Star Oil Works Company was organized by D. G. Scofield, who later became President of the Standard Oil Company of California.

The two children on the float are Ricardo Cezon and Derry Deane, child movie stars who have appeared in many successful motion pictures.

The theme of this year's Pasadena Tournament of Roses parade was "Golden Memories," and was viewed by 1,250,000 spectators.

Refinery Workers' Pay Boosted 19 Per Cent

The number of wage earners in petroleum refineries increased 7½%, and average payments showed a gain of 19 per cent from 1935 to 1937, according to a preliminary report from the 1937 Census of Manufactures by the U. S. Census Bureau. Total wages increased 28 per cent.

The average number of wage earners employed in refineries during 1937 was 83,183, compared with 77,402 in 1935. Total wages paid out in 1937 were $140,414,750, or $30,000,000 in excess of the 1935 total of $109,610,774. Annual wage payments per employe averaged $1,688.02 in 1937, an increase of more than 19 per cent from the 1935 average of $1,416.12.

Standard Oil Co. of California's grand prize winning float.

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State Drilling Report

Field	Company	Well	No.	Sec.	Twp.	Range
	NEW WELLS					
Newhall	Barnsdall Oil Co.	Rancho San Francisco	5	26	4N	17W
Torrance	Peters Royalty Corp.	Bass	1	23	4S	14W
	W. E. McCaslin	McCaslin Springman	1	23	4S	14W
	Felix Mallon	Mallon	3	23	4S	14W
	Felix Mallon	Mallon	4	23	4S	14W
	Cuba Oil Co.	Cuba	1	23	4S	14W
Montebello	Standard Oil Co.	Kaufman Fee	2	2	2S	12W
Los Angeles County	Richard T. Grady	Sepulveda	1	23	5S	14W
Wilmington	Sonwell Oil Co.	Sonwell	5	2	5S	13W
	Union Pacific Railroad Co.	Union Pacific	103	3	5S	13W
	Union Pacific Railroad Co.	Union Pacific	104	3	5S	13W
	Union Pacific Railroad Co.	Union Pacific	105	4	5S	13W
	Union Pacific Railroad Co.	Union Pacific	106	4	5S	13W
	A. Haines		1	2	5S	13W
Orange County	Patos Drilling Co.	Graham	1	21	5S	11W
Ventura	Tide Water Assoc. Oil Co.	McGonigle	14	23	3N	23W
	Shell Oil Co.	Taylor	98	28	3N	23W
Midway	Standard Oil Co.		218	15	32S	24E
	The Texas Co.		32	32	32S	24E
	National Oil Co.		32	35	32S	23E
Rio Bravo	General Petroleum Corp.	Caldwell	1	35	28S	25E
Coalinga	General Petroleum Corp.	Esperanza	103	6	20S	15E
	General Petroleum Corp.	Esperanza	102	6	20S	15E
Belridge	Belridge Oil Co.		39-26	26	27S	20E
Fruitvale	Western Gulf Oil Co.	Ansolabehere	1	14	29S	27E
	Pacific-Southwest Oil Co.	Pacific-Southwest Dillon	1	27	29S	27E
Kern County	The Texas Co.	KCL	35-1	35	28S	26E
	Amerada Petroleum Corp.	Beer	6	21	26S	19E
	The Superior Oil Co.	Clerico	1	26	29S	28E
Lost Hills	Tide Water Assoc. Oil Co.	Williamson	11-R	2	26S	20E
Rosecrans	Bankline Oil Co.	Kirby	2	20	3S	13W
Huntington Beach	Southwest Exploration Co.	State	7	3	6S	11W
	Southwest Exploration Co.	State	8	4	6S	11W
Greeley	Standard Oil Co.	K. C. 11	17	18	29S	26E
	Standard Oil Co.	K. C. 12	6	30	29S	26E
	DEEPEN OR REDRILL					
Huntington Beach	Signal Oil & Gas Co.	Two and One	4	10	6S	11W
	Standard Oil Co.	Bolsa	34	34	5S	11W
	The Texas Co.	Brown	2	11	6S	11W
Long Beach	Zephyr Oil Co.	Noll	1	24	4S	13W
Domingues	Shell Oil Co.	Reyes	21	34	3S	13W
Torrance	Huntington Signal Oil Co.	Clark	1	23	4S	14W
	Campeet Oil Corp.	Kleinmeyer	17-A	24	4S	14W
	C. C. M. O. Co.	Kettler	12	23	4S	14W
Kern County	Richfield Oil Corp.	Western A	32-32	32	30S	25E
Midway	Honolulu Oil Corp.		65	6	32S	24E
Mountain View	Barnsdall Oil Co.	Morris	5	32	30S	29E
	Mohawk Petroleum Corp.	Clendenen	9	30	30S	29E
Kettleman North	Standard Oil Co.		43	19	21S	17E
South Mountain	The Texas Co.	Harvey	22	13	3N	21W
	The Texas Co.	Willard	24	18	3N	20W
Kern River	California Star Oil Co.		9-40	22	28S	27E
Wilmington	Selegna Drilling & Prod. Co.		5	32	4S	13W
	ABANDON					
Los Angeles County	The British American Oil Producing Co.	Pico	1	12	2S	12W
Rincon	Ridge Oil Co.	Fox	1	9	3N	24W
Coyote Hills	Shell Oil Co.	Du Bois	1	22	3S	9W
Long Beach	The Texas Co.	Moore	2	19	4S	12W
Arroyo Grande	J. D. Martin	Pricco C	1	5	32S	13E
Kern County	Dr. F. M. Pottenger	Villard	1	2	26S	28E
Round Mountain	Eastmont Oil Co.	Olcese	9-28	9	28S	29E
Fresno County	Cyrus Peirce, Agent	Shorb	1	16	14S	12E

Summary	Week Ending December	Previous Week	To Date This Year	To Date Last Year
Total New Wells	15	13	1162	1643
Total Deepened or Redrilled	10	17	799	710
Total Abandoned	6	11	532	576

Summary	Week Ending January 7	Previous Week	To Date This Year	To Date Last Year
Total New Wells	20	15	20	30
Total Deepened or Redrilled	7	10	7	10
Total Abandoned	2	6	2	12

LAUGH THIS OFF

In the oil business there is an old saying to the effect that all work and no play makes jack.

And according to **Gene Arnold,** paper money is so scarce, and silver dollars so prevalent up in the San Joaquin Valley that when the Basin boys are transferred north, the story is usually circulated that they have moved up into the big money.

Roy Fry tells about one poor guy who landed a job in Taft, and had been idle so long before, that when he got his first big silver dollar, he thought it was a paper weight.

Then there was the petroleum engineer who told his wife, "I know somebody's been taking the money out of the baby's bank, because when I counted it yesterday, there was almost enough to buy me a new niblick."

"With such a disposition," said **Red Wilson** to **Frank Coyle,** "That fellow ought to go far." "Yeah," replies Frank, "the farther the better."

Red, you will remember, as the composer of that popular ditty, "You take the high gauge, and I'll take the low gauge."

The applicant was talking earnestly to **Wynn Lynch,** "I'm not exactly worried yet," he said, "I know I can get a job if I look hard enough." "Well," sympathized Wynn, "You certainly look hard enough."

By the way, did we ever tell you **Stew Watson's** story about the rousty who quit because his conscience was bothering him. He explained that he always felt as if he was cheating a team of horses out of a job.

And one of the most unusual industrial accidents with which we have ever become acquainted was related by **John Howell** the other day. The victim is in the hospital with severe lacerations just because the stupid overestimated his strength and tried to raise a small check.

It just shows how careful a man has to be. No safety minded individual would ever ask for an increase unless he had on a safety helmet.

Doug Balthis is on deck again with the story of an equipment salesman who asked the efficient secretary, "Are you sure the boss isn't in?" "Certainly," she snapped, "Do you doubt his word?"

While **Bill Hay** tells about the Brea telephone girl who spent a disastrous Saturday at Santa Anita. It seems she was always choosing the wrong plugs.

And that recalls **Scotty Connelly's** yarn about the Calendonian who squandered sixpence one Saturday night in Glasgow—another version of the Highland Fling.

"Why are you looking for work here?" asked the gang foreman, "Didn't I fire you just the other day?" And the astute rousty answered, "Yeah, but ain't it right to always look for things first where you lost 'em?"

Harry Lee, the well-known sportsman, and authority on the scramble-eared gentry, says that most of the beeg rassling fellahs are very artistic in spite of their bulk, and apparent ferocity. Even in the ring they are everlastingly trying to get something down on canvas.

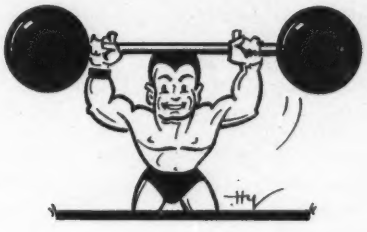
The fighters are very high class people, too, and seem to stand in well with the aristocracy. You will remember that Gene Tunney was once saved by a long Count.

Now reverting to the favorite sport of the oil men—divot lofting, we saw a Santa Fe Springs pumper last Saturday all teed up and ready to be driven some place.

And for the Badminton addicts who are constantly mislaying some part of their equipment, **Frick Gibbs** says the sports shops are selling a neat case in which it can all be carried compactly, and now the whole business can be mislaid at the same time.

Which concludes another mighty instructive session. Remember, however, that circumstances alter cases, and that the man who is branded as a wife deserter is frequently just a refugee.

STRENGTH



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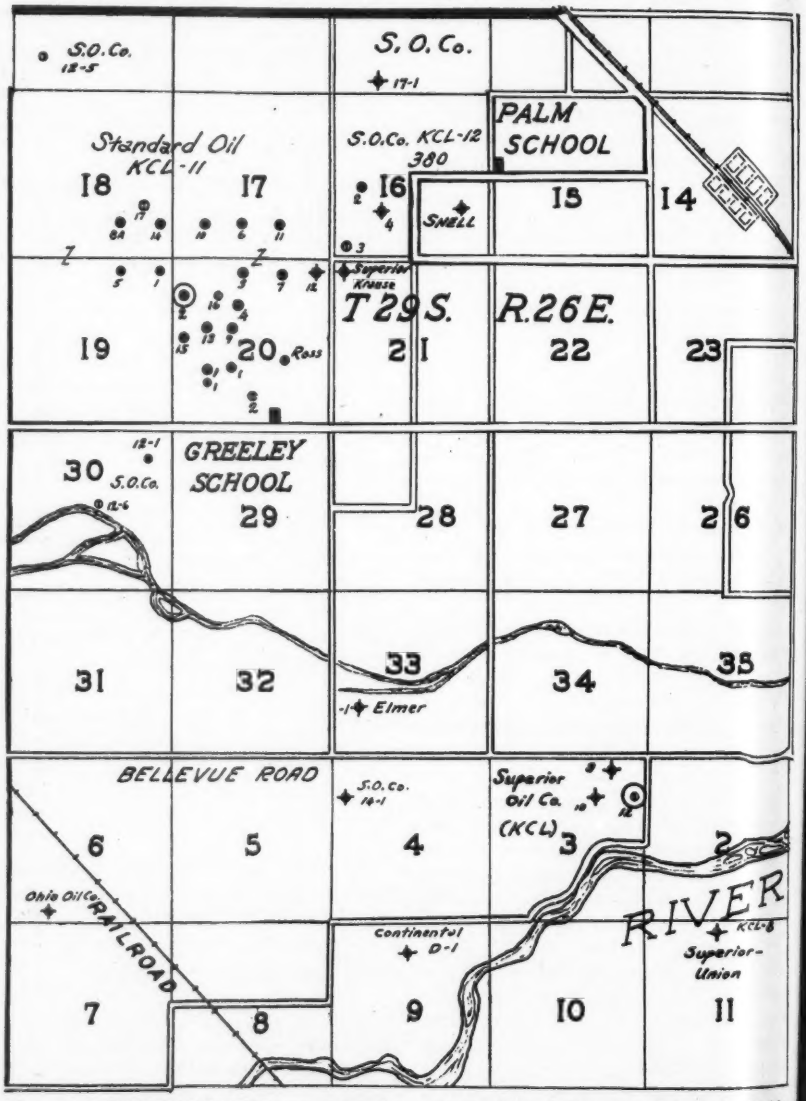
Field Development

San Joaquin Valley

Discovery Rewards Superior's Persistence

For nearly twenty years one of California's most persistent wildcatters, "Bill" Keck at least appears to be rewarded with a major discovery. A few days ago his company, Superior Oil Co., picked up 70 ft. of good oil sand in KCL No. 12, located three miles southeast of the Greeley field in what is known as the McClung area. Topped at 11,120 ft., the sand is believed to be the Vedder or Rio Bravo zone which is already productive in three valley floor fields. The well is located in the northeast corner of sec. 3, 30-26 and adjoins two dry holes which the company drilled during the past year and a half to test the Stevens zone. The first of these, KCL No. 9, was once completed flowing 850 bbls. from 7580 ft. but died within 48 hours. Repeated attempts failed to return the well to production. KCL No. 10, drilled to 8500 ft., encountered no oil sand at all. In the year 1937, Superior joined with Union Oil Co. to drill KCL No. 8 in sec. 11,30-26 to a near world record depth of 12,618 ft.

Climaxing a long and successful career as an independent operator in the state of California, the past eighteen months have been more than kind to Mr. Keck's company. In the fall of 1937, Union Oil Co. discovered the Rio Bravo field in which Superior holds much acreage. Under the aggressive direction of Mr. Keck and his son, Bill jr., Superior considerably extended productive limits. Meanwhile the company had acquired properties in the Long Beach Harbor section of the Wilmington field on which were obtained some of the field's best wells. A portion of Superior's holdings proved good in the Torrance townlot boom. Discovery of the Coalinga Eocene Pool in June found Mr. Keck well protected with both fee property and leases and to date his company has extended production a mile to the north and a mile to the east of the first well. With the true pioneer spirit of always being willing to take a chance, Superior drilled Maxwell No. 6 at Rose-



Map of GREELEY-McCLUNG area showing relationship of Superior Oil Co.'s Vedder discovery well, KCL No. 12, to the established production in the Greeley field. The circled well in section 20, 29-26 is Standard Oil Co. KCL No. 11-2 which is producing from the Vedder sand.

crans, thereby extending O'Dea zone production south to the bend in Main St.

A pioneer also in the field of drilling, Superior Oil Co. has been a leader in perfecting technique for making fast, straight, and safe hole. With the use of new heavy equipment and sound drilling practice, the company astounded the oil fraternity with its records in the Wilmington and Rio Bravo fields. Probably a world speed record for a wildcat well was set by KCL No. 12 which required only 60 days to drill 11,100 ft.

Rio Bravo Edge Seen In Union Kernco 7-34

Indicating that the southwest edge is near at hand, Union Oil Co.'s last Rio Bravo completion, Kernco No. 7-34 came in flowing 2000 bbls. a day with a 20% salt water cut. Location is 330 ft. north and 990 ft. west of the southeast corner of sec. 34,28-25, offsetting the General Petroleum Corp. Van Ness lease. No. 7-34 encountered the top of the oil sand at approximately 11,400 ft., penetrating the zone to 11,515 ft. After several days flow, the well was killed and the liner milled up to plug bottom.

General Petroleum Corp. is the only active operator in the field at the present time. The company's Van Ness No. 3, sec. 2,29-25 is below 10,000 ft. and Caldwell No. 1, sec. 35-28-25, is approaching 6000 ft.

Superior Cagle No. 1 Big Eocene Producer

With an initial flow of 3200 bbls., through a 16/64 in. bean, Superior Oil Co. brought in Cagle No. 1 extending the field nearly a mile to the north. Gravity of the oil was 30 and, like all other Coalinga Eocene wells, production was free of water.

Top of the Avenal pay sand was encountered at 7120 ft., approximately 600 ft. lower when corrected for elevation differences than the highest structurally located wells. The entire thickness of zone was cored, solid oil sand continuing to 7696 ft. where siltstone was entered. Hole was bottomed at 7711 ft. Located 330 ft. north and 330 ft. west of the south quarter corner of sec. 6,20-16, Cagle No. 1 proves up a large amount of acreage for Superior, Texas and several other companies. Texas has already started foundations for Exeter No. 1 in the same section while Holly Development Co. and Pure Oil Co. are expected to follow shortly. Other offset wells have been started by Robert S. Lytle and Superior Oil Co.

Operator Lytle topped the Gatchell sand in two wells during the past few days. Well No. 37, sec. 7,20-16, placed the top at 6886 ft. and well No. 71, sec. 18,20-16 entered the zone at 7516 ft. Standard Oil Co. well No. 1, sec. 17, set casing at 7820 ft. and is preparing to core into the oil sand. The last two wells mentioned are located on the east side in the area opened by Superior's first extension well, Hight No. 1.

Richfield Coring At Union Avenue

After two weeks of reaming from the shoe of the surface pipe to bottom at 8746 ft., Richfield Oil Corp. is again making hole in its important Union Avenue No. 1 south of Bakersfield.

Projects Number Four At Cole's Levee Field

Although three other companies are entering the field, Ohio Oil Co. holds a wide lead in the development of Cole's Levee where it discovered deep production in KCL No. F-1 two months ago. Now below 7500 ft., Ohio's KCL No. F-2 is far ahead of its closest rival, Standard Oil Co.'s KCL No. 20-1 which is just spudding in. Both of the former company's wells are in sec. 10,31-25 while the Standard project is in sec. 9. Union Oil Co. is preparing to spud Kernco No. 1-11 in sec. 11

Don't LET PUMP FAILURES STEAL DAYS FROM YOUR PRODUCTION CALENDAR

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The same qualities that make Fluid Packed Pumps efficient and economical in sandy wells insure exceptional service from them under many other conditions also. Give them a trial—there is a size and type to meet your needs.

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Brisk Activity Marks Coalinga Area

Stimulated by the sensational Eocene Pool, activity continues brisk throughout the entire Coalinga area. Five miles north of the present Gatchell zone development, Amerada Petroleum Corp. is drilling S. P. L. No. 7 in sec. 17,19-16, the last depth reported being 1560 ft.

In the old shallow areas, several companies are attempting to develop new production. To date General Petroleum Corp. has been the most successful, having obtained two 50 bbl. wells on the Esperanza lease at 1300 ft. The company is drilling two more and is reconditioning an old well on the property, which is located in sec. 6,20-15. In sec. 35,20-14, Harry P. Diamond is drilling well No. 7; Foreign Oil Co. is down 1100 ft. with Pacific States Annex No. 6 in sec. 6,21-15; Progressive Oil Co. of Coalinga No. 3, sec. 20,19-15, is below 800 ft. and Section 30 Oil Co. has made 1600 ft. of hole in well No. 5, sec. 30,19-15.

Wheeler Ridge Test Flows, Then Pumps

KCL No. 1, Richfield Oil Corp.'s deep test of the Wheeler Ridge field, cannot yet be considered a completed well. With 9272 ft. hole plugged to 8765 ft., and perforations open below the shoe of the water string at 8562 ft., several day's swabbing resulted in an intermittent flow which at one time was gauged at the rate of 1800 bbls. per day. After nearly a week of swabbing and flowing by heads, a pump was installed which steadied production to 275 bbls. a day of 37.5 gravity oil. Considerable water is produced with the oil, the cut varying from 20 to 70%. A water locating instrument indicated the plug was faulty and it is probable that remedial work will be undertaken soon.

SAN JOAQUIN VALLEY WILDCATS

Fresno County

Area	Well	No.	Section	Depth	Status
Coalinga	Amerada Pet. Corp., SPL	7–17	17, 19-16	1500	Drilling
	American Oil Fields, Inc.	1	16, 19-15	250	Idle
	Foreign Oil Co.	6	6, 21-15	1100	Drilling
	Jarvis, Leo P.	2	14, 20-14	218	Idle
	Progressive Oil Co.	3	20, 19-15	810	Drilling
	Stuart Oil Co., Stuart	1	12, 21-14	1285	Idle
	Tide Water Assoc. Oil Co., Fleishacker	1	1, 19-15	7378	Abandoned
Jacalitos Hills	Dauphin Dev., Ragan	1	30, 21-14	4587	Idle
Mendota	Pierce, Cyrus, Shorb	1	16, 14-12	1580	Abandoned
Reef Ridge	MCA Drilling Co.	1	33, 22-16	275	Drilling

Kern County

Arvin	Superior-Standard-Texas, Jewett	1	16, 31-29		Rigging up
Buttonwillow	Calif. Explor. Co., Salisbury	1	7, 29-24	11450	Drilling
Canal	Shell Oil Co., KCL	B-87	4, 30-25	10945	Drilling
Coles Levee	Ohio Oil Co.	KCL-F2	10, 31-25	7175	Drilling
	Standard Oil Co.	KCL 20-1	9, 31-25		Rigging up
	Tide Water Associated	KCL-1	14, 31-25		Location
	Union Oil Co., Kernco	1–11	11, 31-25		Rig
Devil's Den	Amerada Pet. Co., Beer	6	21, 26-19	3021	Drilling
	Emigrant Hill Oil Co.	1	24, 25-18	4104	Idle
	Herzog, Raymond D.	1	27, 25-18	323	Drilling
	Goodrum. Geo., Baron	1	24, 25-18	1210	Idle
Edison	Hillview Oil Co., El Tejon	1-A	27, 30-30	2100	Drilling
	Renner & R.H.L. Oil Co.	1	27, 30-30	2600	Testing
	Superior Oil Co., Clerico	1	26, 29-28	2565	Drilling
Elk Hills	Richfield Oil Corp., Tup.-W.	1	32, 30-25	8677	Producing
Grapevine	Petrol Corp., Reserve	33-5	33, 11-19	7108	Drilling
	Richfield Oil Corp.	KCL-1	28, 11-20	9272	Producing
	Tide Water Assoc. O. Co.,S.P.	2	15, 11-19	6895	Drilling
Lerdo	Texas Co.	KCL 35-1	35, 28-26	4815	Drilling
	Shell Oil Co.	KCL A-23	2, 29-26		Rig
Lost Hills	California Lands, Occidental	2	24, 26-20	2636	Drilling
McClung	Superior Oil Co.	KCL-12	3, 30-26	11313	Drilling
Mt. Poso	Vendome Oil Co.	1	28, 26-28		Rig
	Shell Oil Co., Glide	58–29	29, 27-28		Rig
Midway	Fried, Julius	1	34, 32-24	5031	Testing
Union Ave.	Richfield Oil Corp., Union Ave.	1	6, 30-28	8775	Drilling
Upper Kern River	Rufener, Jules, Julianne	1	2, 29-29	1440	Abandoned
	Shell Oil Co., S.P.L.	1	7, 29-30	3509	Abandoned

3390 Bbls. For Shell In Canal Completion

Flowing initially at a rate exceeding 3390 bbls. per day, Shell Oil Co. completed KCL No. A-34, as one of the largest wells yet obtained in the Canal field. Plugged from 8520 ft. to 8425 ft., the project was finished with a drillable liner spot-perforated below 8075 ft. Located approximately 350 ft. north and 700 ft. west of the center of sec. 14,30-25, the well indicates that westerly field limits are yet far from reached. Equipment has been moved to No. A-61 which is drilling in the northeast quarter of the section.

In the same section, Ohio Oil Co. is completing KCL No. E-10 with bottom plugged from 8485 ft. to 8325 ft.

In section 4, northwest of the field, Shell Oil Co. is drilling KCL No. B-87 in hard shale below 11,000 ft.

New Promise Shown For Grapevine Area

Showing new promise for the Grapevine area, Tide Water Associated Oil Co. S. P. No. 2, sec. 15,11-19, made a series of formation tests from 6500 ft. to 6800 ft. which indicated the presence of gas and at least small quantities of oil. Now coring ahead at 7000 ft., formation is reported as hard platy shale.

The Petrol Corp., Reserve-Petrol No. 33-5, located in sec. 33,11-19, resumed operations recently and is deepening below 7150 ft. It is believed that the formation productive in Richfield's Wheeler Ridge well may also be encountered in this area.

Union, Associated Plan Wasco Test

Plans are being formulated by Union Oil Co. and Tide Water Associated Oil Co. for an important new wildcat to be drilled in sec. 36, 27-24, six miles southeast of the deep Wasco field. To be drilled by Union, the well will be located on land owned by Kern County Land Co. Approximately a mile and a half to the northwest, Continental Oil Co. recently abandoned its Seaboard-Associated KCL No. C-1 at 13,065 ft. after coring the top of the barren Vedder zone at 12,664 ft.

Buttonwillow Test At Interesting Depth

Dougherty-Salisbury No. 1 of California Exploration Co., Buttonwillow exploratory well, is now one of the most interesting wells in the San Joaquin valley. At last reported depth of 11,400 ft. the formation was brown shale with streaks of gray sand which reacted favorably when tested with acetone. The operators hope to find production in the Stevens zone which has not been tested in this part of the valley. Location of the well is sec. 7,29-24.

Calif. Lands Spuds 2nd Occidental Well

California Lands, Inc., operating subsidiary of Bank of America, has spudded in Occidental No. 2 after skidding the rig approximately 1000 ft. east from the recently junked and abandoned No. 1. Both wells are located in sec. 24,26-20, immediately west of the Lost Hills field.

In the shallow area at the north tip of the field, Tide Water Associated Oil Co. completed Williamson No. 11-R at 1588 ft., pumping 70 bbls. of oil cutting 5% sand.

Wood-Callahan Abandon 21 Community No. 4

Wood-Callahan Oil Co. has abandoned its No. 4 well on the large sec. 21 Community lease in the spotty Edison area. Only poorly saturated oil sands were cored to the final depth of 4300 ft.

Francis O'Reilly is preparing to resume operations on Edison-Seal No. 5 which has been idle at 2585 ft.

Shell Enters Lerdo Play

Shell Oil Co. has derrick erected in the northwest quarter of sec. 2,29-26 for a new wildcat to be known as KCL 2A-23. The location is a mile northwest of the 10,205 ft. abandoned Continental Oil Co. KCL B-1 and approximately the same distance southwest of The Texas Co.'s KCL 35-1, now drilling below 4967 ft.

Joint Arvin Test Ready to Spud In

Jewett No. 1, joint test of Superior, Standard and Texas Companies, is practically rigged up and ready to start the drill. Located in the northeast quarter of sec. 16,31-29, the new well is not far distant from Union Oil Co.'s Berry No. 1 which last year produced a small quantity of oil.

Vedder Absent in Upper Kern Test

Missing was the Vedder zone in Shell Oil Co.'s SPL No. 1, wildcat test well of the Upper Kern River area. Located in sec. 7, 29-30, the project was abandoned in the barren Walker formation at 3509 ft.

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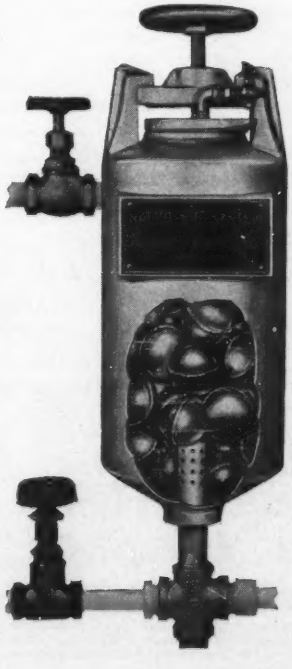

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Los Angeles Basin

Big Wells Create New Torrance Hot Spot

Completions of two more wells in the thousand barrel class have created a new hot spot in the Torrance townlot field. Felix Mallon, who last month set a new record for the Eshelman area with his 950 bbl. No. 2, raised the ante to 985 bbls. in his No. 3 and Whittier-Santa Fe Springs Oil Syndicate No. 1 followed with 1050 bbls. in its first Torrance well. Both are located on the north side of 237th street, west of Walnut Avenue. Mallon's well was bottomed at 5200 ft. and is producing the lower 146 ft. of hole while the Whittier-Santa Fe well has 375 ft. open to 5162 ft. In the same block, Logan Petroleum Co. finished Hadley No. 1A at 5145 ft. with an initial of slightly over 300 bbls. while a block to the north, West Basin Oil Co. Eyster No. 1, a deepening job, was recompleted with an estimated yield of 300 bbls. from 5158 ft. More than a dozen new projects have been started on the strength of these completions.

High bid on the Shell Co. Kettler lease, so far the barrier to further eastward extension, was submitted by D. W. Elliott of Long Beach who is expected to deepen one or more of the old wells immediately.

Four Wells Completed In Torrance Extension

Completion of four wells cut the number of active projects in the Torrance Extension area to two. Largest of the new producers was The Texas Co.'s Oakley No. 2 which was plugged to 5240 ft. after bottoming in the schist at 6109 ft. Production gauged 330 bbls. cutting from 10 to 70% salt water. D & B Oil Co.'s No. 3, Sunset Oil Co.'s Security "T" 2, and General Petroleum Corp.'s Poggi No. 1 all produced from 100 to 200 bbls.

Continental Starts New Seal Beach Well

First new well in many months for Seal Beach is Continental Oil Co. Bixby No. 41 for which foundation has just been poured in the central portion of the field.

Rolling Hills to Test Palos Verdes Wildcat

Rolling Hills Petroleum Co., headed by E. C. McClaren, is planning to make a production test soon in its wildcat well located on the north side of the Palos Verdes uplift. A string of 6⅝ in. casing has been cemented at 5001 ft. and new hole is being made below 5100 ft. Gas showings have been fairly strong in the last few hundred feet encouraging the belief of company officials that a well may be obtained at 5400 ft.

Two Tests 7th Zone At W. Montebello

Soon to test the Seventh or Hathaway zone in the west Montebello field are Smith Comm. No. 1 of Olympic Refining Co. and the Calkins No. 1 of Union Oil Co. The former well, located near the intersection of Maple and Victoria streets, topped the lower sand at 7028 ft. and is running casing after bottoming in a shell at 7137 ft. Calkins No. 1, located at the southeast corner of Lincoln and Montebello Blvd., made a formation test of the interval 6942-7016 ft. during which gas reached the surface in one minute and clean oil in 18 minutes. After a strong flow for 30 minutes, the drill pipe was pulled recovering 830 ft. of oil cutting 12% and 120 ft. of water. Hole is being cored ahead below 7037 ft. It is probable that after production tests of the Seventh zone, both wells will be completed in the Masser sand (Fourth Finger of the Sixth zone).

Indicating that the Masser sand still has plenty of kick, McVicar & Rood Manz No. 3 flowed clean oil at the rate of 900 bbls. a day from 55 ft. open to 6682 feet.

Completed in the Masser zone was Standard Oil Co.'s McDonald No. 1, which, bottomed at 6681 ft., was finished flowing 1168 bbls. in 22 hours of 36 gravity clean oil on gas lift. Standard has five other wells drilling, all below 5000 ft. and two nearing completion in the lower sixth zone.

Three independent companies, Stanley Oil Co., Herley-Kelley, and Lakewood Oil Co. each have a well drilling near the 5000 ft. level.

Six Finished at South Rosecrans

Six wells were recently completed in the Rosecrans field, three of which were in the extreme south portion. South of the east-west section of Main St., J. L. O'Donnell well No. 46 and Hydro-Carbon Products Co. Cole No. 1 were finished at identical depths and with identical initial production estimates, the bottoms being 7750 ft. and the barrels 500. Third of the group was Royalty Service Corp.'s Gordon No. 3, completed at 7835 ft. flowing 35 bbls. per hour. All three wells produced 32 gravity clean oil.

Union Oil Co. brought in two southerly wells, Rosecrans No. 30 for 600 bbls. from 7660 ft. At the northwest

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Athens	Entrikin, W. E.	1	7, 3-13	6520	Abandoning
Bellflower	Clayton, Geo. L., Scott	1	32, 3-12	6897	Idle
Castaic	Royal Land Corp.	1	8, 4-17	1338	Cleaning out
Dominguez	Richfield Oil Corp.	1	2, 4-13	6954	Abandoned
La Mirada	John McKeon and Assoc. Carmenita	1	21, 3-11	8962	Testing
Mojave	Mojave Pet. Co., Gorman	1	5, 8-18	470	Idle
	Jennings	2	33, 5-14	470	Idle
Newhall	Mangrum and Page, Lintz	1	4, 3-15	150	Idle
	Newhall Drlg. Asso., Needham	4	13, 3-16	3505	Cleaning out
	Palmluck Oil Co.	1	23, 3-16		Rig
Palmdale	New-Cal	1	17, 6-12	1170	Idle
Palos Verdes	Rolling Hills Pet.	1	27, 4-14	5100	Drilling
Santa Monica	The Texas Co., A-S	1	9, 2-15	7285	Redrilling
San Pedro	Grady, R. T.	1	23, 5-14	650	Drilling
Whittier	Langstaff, Geo. W., Iliff	1	8, 2-11	2250	Idle
	H. C. Oil Co., Joyce	1	22, 2-11	2750	Drilling
	Orange County				
Anaheim	The Texas Co.	A-13-1	8, 4-10	7500	Drilling
Bolsa Chica	New Fields Oil Co.	1	16, 5-11	4100	Idle
	Patos Drilling Co.	1	21, 5-11	1875	Drilling
Corona del Mar	Shell Oil Co., Irvine	2	6, 7-9	2241	Abandoned
	Shell Oil Co., Irvine	3	6, 7-9	550	Drilling
Costa Mesa	A. V. Oil & Gas Co.	1	16, 6-10	4751	Idle
	San Bernardino				
Carbon Canyon	Carbon Canyon Oil Co.	1	30, 2-8		Rig
Chino	So. Counties Pet. & Drlg. Co.	1	25, 2-8	3000	Drilling
	San Diego County				
Carlsbad	Dauphin Dev. Co., Kelly	1	16, 12-4	1150	Drilling

corner of Figueroa and Rosecrans, Universal Consolidated Oil Co. completed Trust No. 14, a northerly offset to H. B. Oil Co.'s No. 1 which first found the area to be productive. Drilled to 7845 ft., bottom was plugged to 7760 ft. and the well swabbed in flowing by heads.

Soon to be completed are Hydro-Carbon Products Co.'s Duchess No. 1 which has been bottomed at 7815 ft. and Superior Oil's Maxwell No. 12 which is plugged to the O'Dea zone after making an unsuccessful deep test to 8852 ft. Isco Petroleum Corp.'s Rosecrans-Able No. 2 is drilling below 5100 ft. Metcalf Oil Co., a newly formed organization, is skidding to the west the rig erected on the Bradford lease by Bankline Oil Co.

McKeon Continues Carmenita Tests

After some delay occasioned by a lost swab, John McKeon & Associates have resumed the series of tests being made in Carmentia No. 1 in the La Mirada area southeast of Santa Fe Springs. With perforations open near bottom, 8960 ft., swab recovery was only gassy salt water. The next step probably will be to plug and shoot higher.

Offsets Start In Aliso Canyon

With the spudding of Standard Oil Co.'s H. R. Ward No. 1, the new Aliso Canyon offset drilling program got under way last week. Union Oil Co. is preparing to spud Santa Susana-Orcutt No. 1 and Tide Water Associated Oil Co. has the derrick up for Porter No. 2. The discovery well, Porter No. 1, is yet flowing 270 bbls. a day. All wells are located in sec. 27, 3n-16w.

Patos Drilling Co. Spuds Bolsa Chica Well

Seeking production on the much-drilled Bolsa Chica mesa between Huntington Beach and Seal Beach, Patos Drilling Co. has spudded in its test well located on the Graham property west of the golf course. The company hopes to encounter productive oil sands near the 4000 ft. level.

Five Points Centers Huntington Beach Interest

With the starting of four new wells, the Five Points area claims the center of Huntington Beach interest. Derricks are up for Dragon Oil Co. and Reid Petroleum Co. wells north of the little spot of production while Booth Oil Co. has foundations in for its well south of the J. E. F. properties. Amron Oil Co. has not yet started its proposed well at the southeast corner of Huntington Beach Blvd. and Ellis St. but Gunnar Eriksson has started foundations east of the Reid rig.

South and east from the intersection of Delaware and Quincy, The Texas Co. is preparing to drill Brown No. 10 in the old field.

On the ocean front, Southwest Exploration Co. is completing relatively small pumpers under the State-owned tidelands.

Basin Finishes Third, Starts Fourth at Potrero

Continuing its successful development of the Potrero Country Club property, Basin Oil Co. recently finished its third well flowing 345 bbls of 46 gravity clean oil through a 20/64 in. bean. Gas production in 900,000 cu. ft. Each of the company's projects has been completed in a different horizon, No. 3 being the shallowest at 3686 ft. Potrero No. 4 has been spudded approximately 200 ft. east of No. 3 and 600 ft. south of Manchester Ave.

Attorney Fisher Starts North Torrance Wildcat

Arthur C. Fisher, Los Angeles attorney, is forming a new company to drill a large block of acreage immediately north of the city of Torrance. Cellar has been dug for the first well at the northwest corner of 203rd St. and Western Ave.

Long Beach Harbor Board Delays Drilling Award

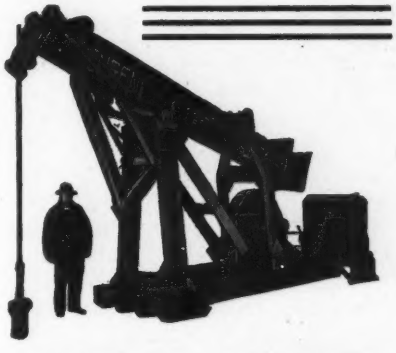
Although record high bids were received by the City of Long Beach from four operators, no contract awards have yet been made. W. E. Ramsey, whose bid on all four parcels was considered highest by the city's engineers, was scheduled to appear before the Harbor Commissioners Jan. 25 to explain his plans for disposing of the oil in case his offers are accepted. Terms offered by Mr. Ramsey included a 60¼% royalty on Terminal production and 31% on Ranger oil. Many usually informed persons believe, however, that new bids will be called for.

With the final settlement of the controversy between the city of Long Beach and the Long Beach Dock & Terminal Co., Signal Oil & Gas Co. started work on four of the ultimate eighteen wells to be whipstocked under the harbor channels. Under separate arrangement, channel wells will be soon started by The Termo Co. and D. D. Dunlap Oil Co.

No spectacular developments have recently taken place within the field, interest being centered largely in the new channel developments and the Franco-American and Padreson wells now drilling in the extreme northwesterly portion of the Wilmington area.

With all operators pledged to the new 300 bbl. per well limit, total field production is now averaging 82,619 bbls. daily, an excess of 13,359 bbls. over the allowable.

Pig tails—coils in refinery pipe for condensation of vapors.



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Coastal District

Litho Oil Spuds Capitan Well

Litho Oil Co. has spudded in its first Capitan well near the southwest corner of the vast Rhode Island Estate property. Now drilling at a shallow depth, the well is north of the State Highway and is an easterly offset to General Petroleum's Erburu lease. Production is sought in the Vaqueros formation which the company hopes to find near the 2000-foot level.

Douglas-Stratton Carreaga 1 Is Wet Oil Producer

Some relief from water trouble was obtained by Douglas-Stratton Oil Co. by cementing a liner through perforations in Carreaga No. 1, deep test well on the southeast extension of the structure from which Shell Oil Co. has been producing for many years in the old Santa Maria field. With bottom at 7238 ft., a 4¾ in. liner including 730 ft. of perforations was landed at 7195 ft. and "c.p.ed" at 6450 ft., about 700 ft. below the shoe of the 7 in. water string. On the pump, initial production was estimated from 300 to 500 bbls. gross with the water content variously placed from 25 to 75%. Latest reports indicated the cut was still increasing. Coming from fractured brown shale, the oil tests better than 28 gravity while the salt content of the water is said to be 1200 grains per gallon. The well is located approximately 1000 ft. north of and structurally higher than the E. C. Arnold Oil Co., Arnold-Apache No. 2 which was completed a year ago as small wet oil pumper.

Richfield's Tinaquaic Shows Tar in Fractures

Showing tar in the fractures of the hard brown Monterey shale, Richfield Oil Corp.'s Tinaquaic No. 1 is becoming one of the most interesting Santa Barbara county wells. To last reported bottom at 3750 ft., however, the showings had not been considered worthy of a production test. Location of the well is in Foxen Canyon, sec. 36, 9-32.

Western Oil Royalties, Ltd. To Drill Carpinteria Test

Western Oil Royalties, Ltd., recently formed by Santa Barbara capital, has announced its intention of starting immemediately on a new test of the Carpinteria area. Location has been selected for Peter C. Bryce No. 1 in block 58 of Carpinteria townsite.

Garvin & Seaman Deepen Old Summerland Well

From the Submarine Oil Co., Garvin & Seaman have taken over State lease No. 17 and are preparing to deepen the well started some time ago by C. B. Gauthier. Present depth is reported to be 1350 ft.

Heavy Rains Halt Ventura Operations

Virtually at a standstill are wildcatting operations in Ventura county since the recent heavy rains made most wells inaccessible. More fortunate than most were Merchants Petroleum Co. and Claran Oil Co. who have been able to keep going because of better road conditions. The former company is drilling Cochrane No. 8 at 1650 ft. while the latter is down approximately 3000 ft. Speik Oil Co., Chappuis No. 1, located in sec. 33, 5-19, is now shut in awaiting completion of a connection to the Union Oil Co. pipeline. With 200 ft. open to 3635 ft., pumping tests have indicated the well capable of at least a 50 bbl. average.

Grubb 10 Cements At San Miguelito

Topping the oil sand at 5515 ft., Continental Oil Co. has cemented a string of 7 in. casing at 5545 ft. in Grubb No. 10 in the San Miguelito field. Present depth of the hole is 5686 ft.

In the Padre Canyon area, Chanslor-Canfield Midway Oil Co. is recementing Hobson No. A-6 after pumping 200 bbls. cutting 60%. Total depth is 5426 ft. Hobson No. A-7 is building derrick.

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Monterey	Anderson, A. A., Hillman	1	15, 24-14	4004	Idle
	Texas Co., Arroyo Seco	1	11, 19-15		Location
Stanislaus	Orestimba Oil Co.	1	12, 7-7	1550	Idle
	Santa Maria Pet. Co.	1	34, 1-10	2250	Cleaning out

COASTAL COUNTIES WILDCATS

Santa Barbara County

Area	Well	No.	Section	Depth	Status
Capitan	Litho Oil Co., Rhode I.	1	4, 4-30	175	Drilling
Carreaga	Douglas-Stratton Oil Co.	1	8, 8-33	7240	Pumping
Foxen Canyon	Richfield Oil Corp., Tinaquaic	1	36, 9-32	3750	Drilling
Gaviota	Gaviota Oil Co., Hollister	1	35, 5-33	3215	Idle
Gato Ridge	Barnsdall Oil Co., Mag	5	9, 8-32	3035	Redrilling
	Pezzoni	1	15, 8-32	4494	Idle
Summerland	Oil Group, Inc., Hyland	1	16, 4-26		Rig

San Luis Obispo County

Edna	Loma Linda Oil Co., Lewis	1	28, 31-13	2125	Idle
Elk Horn	Calif. Pet. Prod. Co., Irons	1	19, 10-24	1825	Fishing
	Lee, Harry, Defiance	1	7, 32-22	290	Idle
	Western Plains Oil Co.	1	7, 31-21	4010	Idle
Huasna	Hancock O. Co.,Scherer-Dickes	1	30, 12-33	5593	Idle
Paso Robles	Vanguard Oil Co., Clark	1	26, 27-14	4950	Idle
	Epco., Inc.	1	27, 26-13	3920	Drilling

Ventura County

Ojai	High Mesa Oil Co.	1	16, 4-22	1770	Idle
Red Mountain	Martin, J. W.	3	15, 4-21	1250	Idle
Sespe	Drain Oil Co., Cosby	1	14, 4-19	1120	Idle
	Claran Oil Co., Hardison	1	22, 4-20	2925	Drilling
	Commander Oil Co.	7-F	13, 4-19	575	Idle
	Crystal Oil Co., Crystal	1	35, 5-20	250	Idle
	Ivers, H. A., Kentuck	14	1, 4-20		Location
	Merchants Pet., Cochran	8	1, 4-20	1650	Drilling
	Speik Oil Co.	1	33, 5-19	3637	Idle
	St. Louis	1	1, 4-20	2000	Pumping
Shiells Canyon	The Texas Co., Shiells	136	4, 3-19	3070	Testing
	El Rancho Oil Co., Elkins	2	9, 3-19	1250	Drilling
South Mt.	Clipper Oil Co.	1	17, 3-20		Rig
Tar Creek	Section 20 Oil Co.	1	20, 5-19	2460	Drilling
Timber Canyon	Stallings, Senter, Ahlberg	1	24, 4-21	1445	Idle
Ventura	Ventura Drilling Co.	1	10, 3-23	2285	Idle
	Ventura Exploration Co., Sexton	1	30, 3-22	9511	Idle
Wheeler Canyon	P & M Oil Co.	1	24, 4-22		Location

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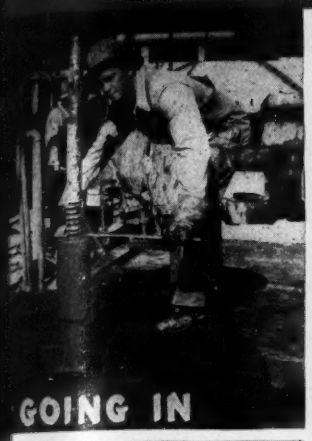

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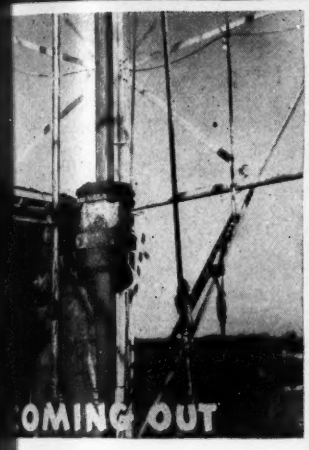

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EED ROLLER BIT COMPANY

Lloyd Corp. to Deepen Ventura Ave. Outpost

Failing to obtain more than a scum of oil on the fluid swabbed from well No. 2, Lloyd Corp. is cleaning out to deepen in search of more prolific horizons. The interval tested was from 6440 ft. to 7060 ft. The well is located on the east plunge of the Ventura Avenue structure.

Shell Oil Co. and Tide Water Associated Oil Co. each completed a large well within the proven limits of production. Taylor No. 97 was brought in by Shell with the initial gauges showing 1277 bbls. in 14½ hours. Tide Water Associated Oil Co. finished Lloyd No. 81 at 8980 ft. flowing 1625 bbls. of 31 gravity clean oil. Associated also made a formation test in V. L. & W. No. 36 during which the well flowed 700 bbls. a day of 31.6 gravity oil cutting 4.2%.

Fourteen wells are now drilling in the field. Near Ventura Ave., Alliance Petroleum Corp. is drilling Hisey No. 3 below 2300 ft. and British American Oil Producing Co. is still attempting to straighten the hole in Hartman No. 7 which had once attained a depth of 6600 ft.

NORMAN L. DORN

Norman L. Dorn, of Lane-Wells Co., Los Angeles, Calif., collaborated with E. L. Decker on a paper entitled "The Care and Maintenance of Instruments Used on Drilling Rigs," presented before Production group session on Drilling and Production Practice, Nov. 17, in connection with the American Petroleum Institute's Nineteenth Annual Meeting in the Stevens Hotel at Chicago, Ill., November 14 to 18, 1938.

Mr. Dorn's experience in the petroleum industry dates back almost 20 years when he joined the engineering department of Shell Oil Co., later becoming production superintendent of Shell's Long Beach (Calif.,) Division. He then went with the Alexander Anderson Oil Well Survey Co., at Fullerton, Calif. When this company was purchased by Lane-Wells Co., Mr. Dorn was advanced to chief engineer, and later made director of the company. Currently, he is directly in charge of all Lane-Wells operations in gun-perforation, oil well surveys, electrical logging, directional drilling services, and the use of packers, liner hangers and survey instruments.

ELMER L. DECKER

Elmer L. Decker, of Martin-Decker Corp., Long Beach, Calif., collaborated with Norman L. Dorn on a paper entitled "The Care and Maintenance of Instruments Used on Drilling Rigs," presented at the Production group session on Drilling and Production Practice, Thursday morning, Nov. 17, in connection with the Ninteenth Annual Meeting of the American Petroleum Institute in the Stevens Hotel at Chicago, Ill., November 14 to 18, 1938.

Mr. Decker was born in April, 1898 at Ottumwa, Iowa. He moved to California in 1915 and, after several years of oilfield experience in the San Joaquin Valley, was attracted to Oklahoma where he joined a group wildcatting in that state. Later, he went to Texas and was driller, tool-pusher, and contractor in the Burk-Burnett and Mexia booms. At the time of the first Huntington Beach boom, he returned to California. In 1928, he purchased an interest in the Martin-Loomis Corp., a concern engaged in the development and manufacture of instruments used in the drilling for and production of oil. The name of this firm was later changed to Martin-Decker Corporation. He has traveled extensively in North and South America for the company, and, currently, is sales director.

Texas Completes Sheills No. 136

With 8⅝ in. casing cemented at 2890 ft. and bottom plugged from 3070 ft. to 2955 ft., The Texas Co. is completing Sheills No. 136 in the Sheills Canyon field. Landed on the plug is a 6⅝ in. liner containing 80 mesh perforations. Good production is expected from the well as on a 30 minute formation test, a recovery of 1100 ft. of clean oil was obtained.

El Rancho Oil Co. is drilling its second well on the Elkins property below 1300 feet.

Mdivani No. 2 Flows At Santa Barbara Mesa

Trans-Oceanic Oil Co. Mdivani No. 2, located on the Lowe property at Santa Barbara Mesa, was recently brought in on an open hole test in the Vaqueros at 1501 ft. Initial production was estimated at 75 bbls. per day but later dropped to about 25 bbls. The oil is 16 gravity and cuts 5% water. Forty feet of sand were penetrated.

Texas to Drill Monterey County

Continuing its search for production in the Arroyo Seco area of Monterey county, The Texas Co. has announced the location for another wildcat well. The new project, to be known as Arroyo Seco No. 1, will be in the southwest quarter of sec. 11, 19s-5e, 15 miles west of King City.

J. C. Simpson Selling For Standco Bolt Co.

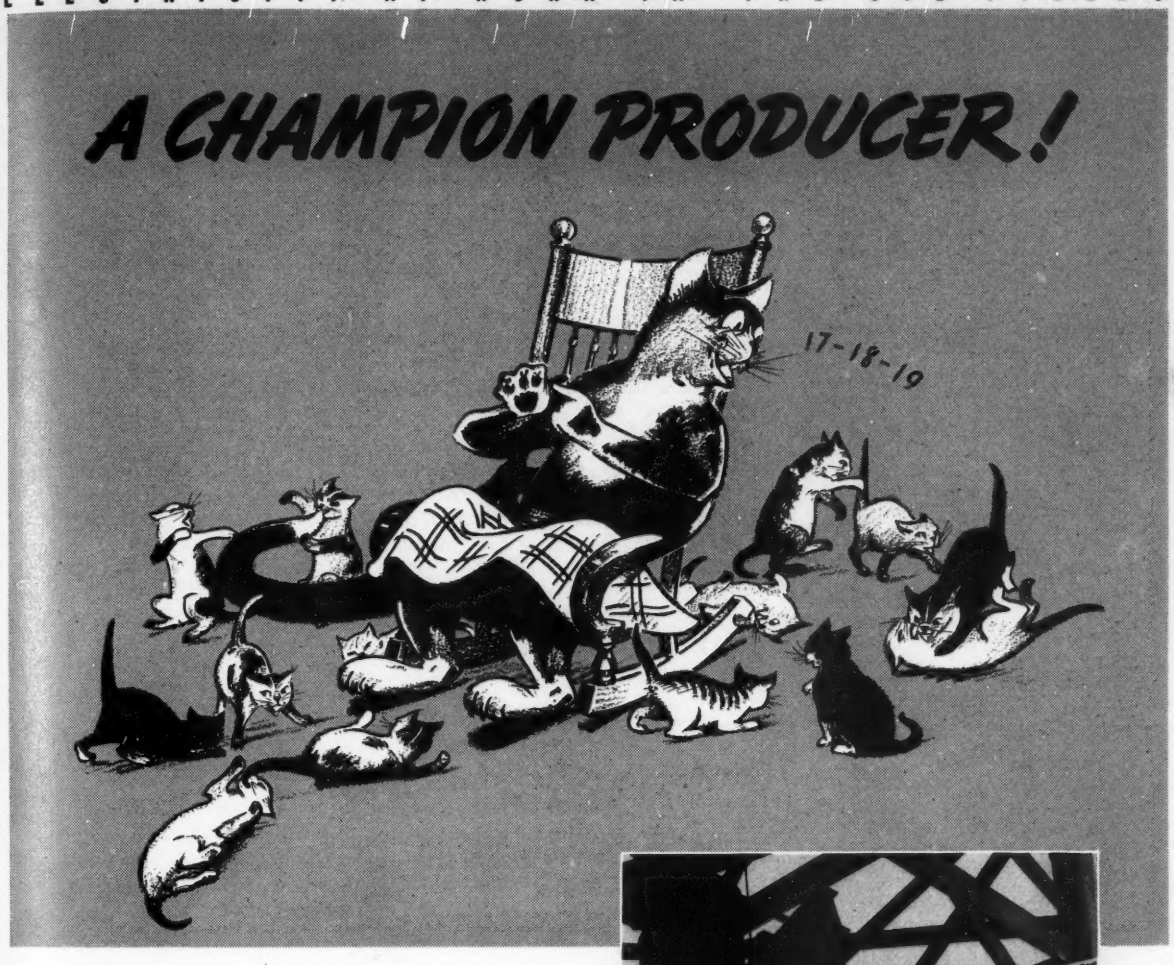
The many friends in the California petroleum industry of J. C. (Jim) Simpson will be very pleased to learn that he is actively connected in selling work with the Standco Bolt Company, manufacturers of Standco Precision Bolts and Standco Brake Lining. Jim reports that his products are being handled by the California supply companies and carried in stock at their field stores.

Jim's headquarters are at 2407-11 South Main Street, Los Angeles, and his friends can reach him by phoning PRospect 6428.

Production Paper Abstract

The Care and Maintenance of Instruments Used on Drilling Rigs, E. L. Decker and N. L. Dorn. Abstract: Advances in rotary-drilling technique have found the crews unprepared to handle the instruments necessary to this progress. Carelessness, negligence, and abuse still occur. The need is shown for care and maintenance routines, and the benefits from such programs are brought out by reports from operators. Fixed responsibility, instruction of crews, and steps to minimize the occurrence and effects of abuse are recommended.

ELECTRICITY AT WORK IN THE OIL FIELDS



It is not at all uncommon to find that the daily production of a well increased 10% to 30% after the installation of an electric motor drive. The constant speed of the electric motor creates a favorable condition in the well, and enables the pump to get the most from the well.

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Turner Petroleum Co., Well No. 2. Vernon Tool Unit equipped with 15 horsepower motor.

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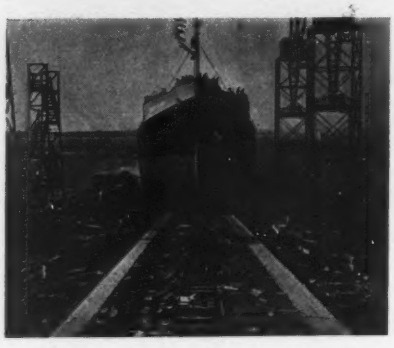
1-39

L. P. St. Clair Honored In Naming Union Tanker

Climaxing an important day for shipping on the Pacific Coast, the new Union Oil Co. of California tanker L. P. ST. CLAIR was launched recently at the Sparrows Point Yard, shipbuilding division, of the Bethlehem Steel Co. Mrs. L. P. St. Clair, wife of the chairman of



Union Oil Company's new safety tanker, L. P. ST. CLAIR, slips down the ways at Sparrows Point, Maryland. This 13,000-ton ship, built by the ship building division of Bethlehem Steel Company, was launched on December 10. Named in honor of Union's former president and present chairman, the L. P. ST. CLAIR will go into service early next April.

Union Oil's board of directors, christened this new ship before it slipped down the launchway. Mr. St. Clair, in whose honor the ship has been named, and William Groundwater, director of transportation for Union, were present for the ceremony.

When the L. P. ST. CLAIR goes into service next April, it will be the eleventh and largest vessel in Union's seagoing tanker fleet. Having a dead weight of 13,000 tons, it will carry 104,000 bbls. of oil. It has every modern device for safety and comfort of the men. Particular attention has been given to the living accommodations. The officers will have individual quarters, while 16 rooms are provided for the 31 men required to make up a crew. A special ventilating system provides 15 complete changes of air every hour in all living quarters and mess rooms. The ship is equipped with a chilled drinking water system, and a distillation apparatus which can produce drinking water from the sea in case of emergency. Accommodations also include a smoking room, hospital, laundry, cold storage facilities, and ample provisions for stowage.

For cargo efficiency the tank space is divided into 24 compartments so that many grades of oil may be carried at one time. The pumping system is designed to load or unload the vessel in less than twelve hours.

Among the ship's safety features are five independent radio receivers, an automatic SOS receiver, a radio direction finder, and complete radio communication equipment having a range of 2,000 miles. In addition to the standard compass, the ship has complete gyro compass equipment and a gyro-pilot automatic steering control. A fathometer and an electric sounding machine are included as well as a continuous three-day course recorder.

The ship is built to the highest class of the American Bureau of Shipping, under their special survey, and it is in accordance with the latest regulations of the Bureau of Marine Inspection and Navigation.

The propelling machinery consists of Bethlehem built steam turbines developing 3500 shaft horsepower, geared to a single screw. Steam is supplied by two Foster Wheeler water tube oil burning boilers.

Dimensions of the L. P. ST. CLAIR are: overall length, 463 ft., moulded beam, 64 ft.; moulded depth, 34 ft. 10 in.; draft, 28 ft. 4 in. It will have a speed of approximately 13 knots.

Remains of Mammoths Uncovered by General

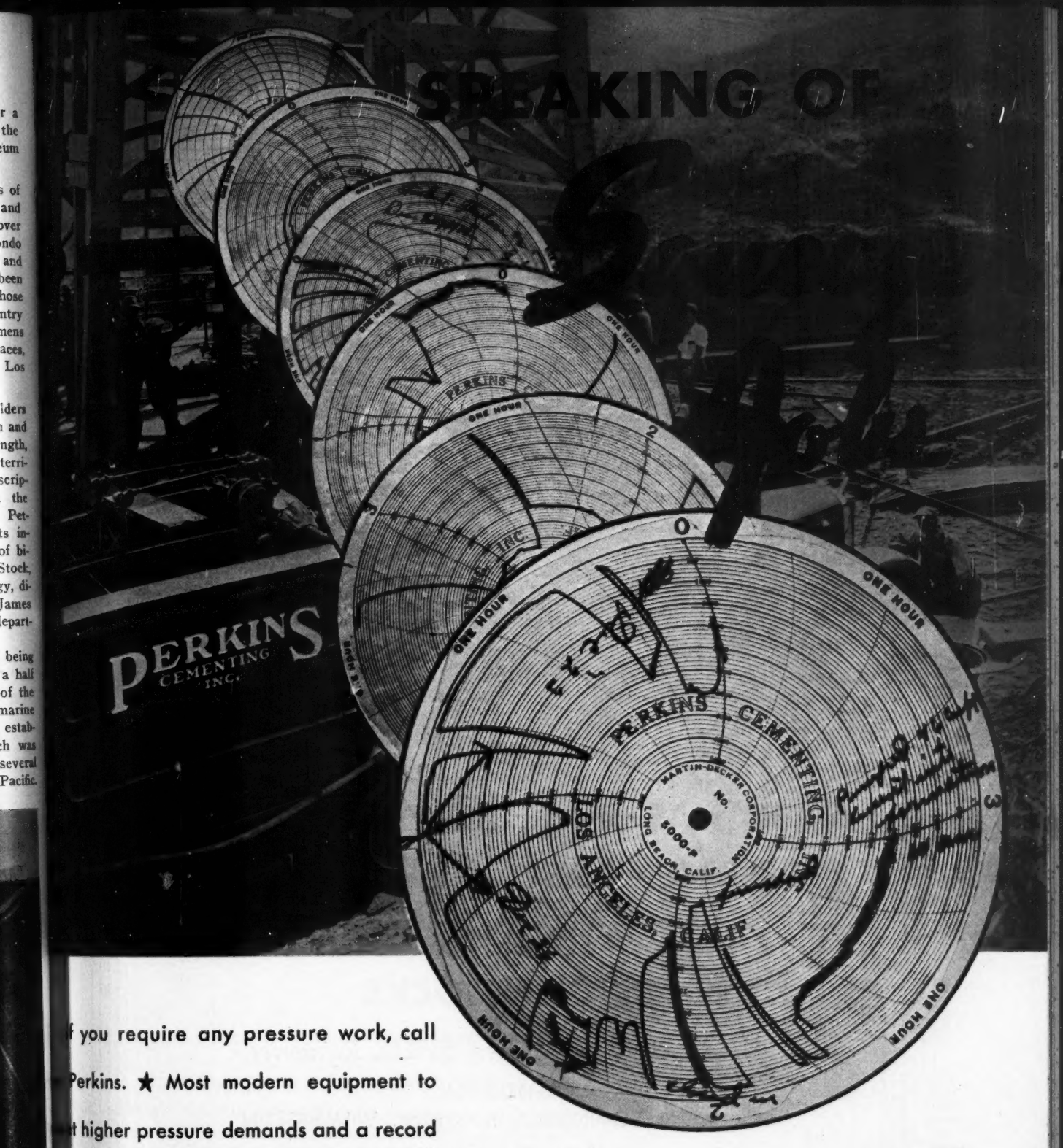
Entrancing story of 25,000 to 100,000 years ago in Southern California has just been revealed with the discovery of many parts of tusks, teeth and various bones of huge animals, while excavating for a great 11-acre fuel oil reservoir on the refinery property of General Petroleum Corp. at Torrance.

Relics of the age when large areas of North America were covered with ice and snow, and when the ocean spread over much of the Torrance-Gardena-Redondo lands now occupied by farms, homes and industrial plants, the remains have been classified by universitiy scientists as those of Mammoths, that roamed this country in large numbers. Similar specimens have been uncovered at many other places, including La Brea pits in western Los Angeles.

Standing 12 feet high to the shoulders with tusks about eight feet in length and with teeth measuring a foot in length, the Mammoths were strange and terrifying creatures, as indicated by descriptions of scientists who examined the articles uncovered at the General Petroleum property. These specialists include Dr. L. H. Miller, professor of biology at U.C.L.A.; Prof. Chester Stock, of California Institute of Technology, division of geological sciences; and James Kimball of General's geological department.

In the great excavation, which is being made for the holding of two and a half million barrels of oil, and is one of the largest pits ever dug in the West, marine shells were found that definitely establish the fact that the ocean beach was once located at this point now several miles from the shoreline of the Pacific.

Partial view of huge excavation for two-and a half million barrel oil reservoir, on General Petroleum refinery property, at Torrance, where remains of prehistoric mammoths were uncovered by tractor operators. Big tank farm is shown in background.



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MID-CONTINENT

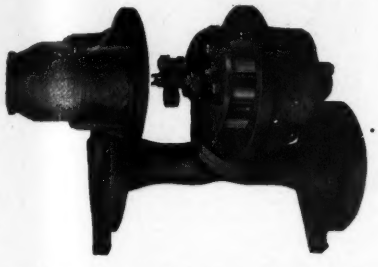
EAST CHICAGO, IND.; WOOD RIVER, ILL.; ARKANSAS CITY, KANSAS

Pipe Line Meter Introduced By Pittsburgh Equitable

The Rotocycle Meter, recently introduced by Pittsburgh Equitable Meter Company, is claimed by the manufacturer to be the first meter ever primarily designed for pipe line service.

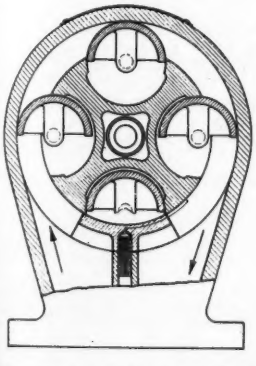
Described as a new development in positive displacement measurement, the Rotocycle is said to measure accurately at all rates of flow, under varying pressures, specific gravities and viscosities. It is stated that the meter is so designed that it will withstand the shocks and strains imposed by pipe line pumping.

The manufacturers' prospectus calls attention to the facts that the Rotocycle



is self-cleaning and that paraffin deposits on the working mechanism will not affect the accuracy.

Pressure loss in pipe lines is an important factor that is receiving more and more attention. Any item in the system that tends to retard the flow will not be tolerated. It is pointed out that in the Rotocycle the oil flows as a continuous streamlined cycle with no appreciable loss in pressure.



The Rotocycle is said to be the first positive displacement meters to have an operating mechanism consisting entirely of rotating parts. The meter consists of an elevated cylindrical housing with an inlet and outlet ports so designed that the flow of oil moves in an unrestricted path. These two ports are separated by a division plate at the bottom of the body so that the liquid can flow in only one direction. The entire mechanism is elevated above the pipe line so that oil enters at the bottom, flows around the measuring chamber and out again at the bottom of the chamber.

The rotor or measuring element of the meter is a cylinder carrying four half-moon shaped buckets equidistantly spaced on its outer circumference which are geared together in a ratio of one to one on top of the rotor. As the rotor turns, the position of these buckets with relation to the side walls of the measuring chamber varys, always however, so that two buckets are in contact to form a closed compartment. The volume in this compartment is a definite displacement and a certain number of these displacements are counted and recorded on the register for every barrel or gallon passing through the meter.

It will be noted that the buckets themselves do not rotate, but travel on an orbit with their centerlines always parallel to the centerline of the meter case. The rotor turns but since the buckets are geared together at a ratio of one to one, they remain in the same relative position to each other throughout each cycle. The action is identical to that of a Ferris Wheel carrying four cars equi-spaced on its circumference. The circumference of the Ferris Wheel corresponds to the outside circumference of the rotor and the cars correspond to the buckets. Gravity in the case of the Ferris Wheel keeps the cars on a plane parallel with the ground, whereas in the Rotocycle gearing is utilized to accomplish the same purpose.

Manufacturers' literature fully describing the Pittsburgh Rotocycle Meter can be obtained by writing Pittsburgh Equitable Meter Company, Pittsburgh, Pa. Ask for Bulletin OG-125.

A. P. I. Spring Meet Slated April 11, in L. A.

The regular Spring Meeting of the Pacific Coast District, Division of Production, will be held on April 11, in the Biltmore Hotel, Los Angeles.

Committees appointed to handle the various details of the meeting are as follows:

Program Committee

Frank Morgan, Chairman, Richfield Oil Corp., Los Angeles; W. H. Farrand, The Texas Co., Los Angeles; Wendell M. Jones, Petroleum Equipment Co., Los Angeles; Paul E. Lehr, Shell Oil Co., Los Angeles; E. K. Parks, Los Angeles; Joe Robinson, Union Oil Co. of Calif., Compton; J. H. Sargent, Kettleman North Dome Assn., Avenal; F. R. Schmieder, Shell Oil Co., Long Beach.

Arrangements Committee

W. L. Heater, Chairman, Baroid Sales Co., Los Angeles; R. P. McKey. Petroleum World, Los Angeles; J. W. McPhee, Lane-Wells Co., Los Angeles; Taber Muller, A. O. Smith Corp., Los Angeles; Warner Parker, Oil Well Supply Co., Los Angeles; J. W. Schmid, The Republic Supply Co. of Calif., Los Angeles; F. R. Schmieder, Shell Oil Co., Long Beach; Alvin Zwernaman, Axelson Manufacturing Co., Vernon.

An all day session will be followed by a dinner meeting, at which an address by a well-known speaker will be presented. The program committee has already held one meeting to initiate the plans and program, and further details will be sent to the membership later.

California Crude Oil Production

Three Weeks Ended January 14, 1939

	January Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	14,890	12,570	*2,320
Belridge—South	1,995	1,029	*966
Buena Vista	16,825	16,786	*39
Canal	3,910	4,075	165
Coalinga-East(Eocene)	2,500	3,083	583
Coalinga-East-West	15,930	6,551	*9,379
Coffee Canyon	2,810	2,839	29
Edison	2,440	2,394	*46
Elk Hills	7,615	9,680	2,065
Fruitvale	6,975	7,189	214
Greeley	2,540	1,850	*690
Kern Front	7,740	7,366	*374
Kern River	5,720	2,620	*3,100
Kettleman No. Dome	57,605	59,452	1,847
Lost Hills	4,280	3,166	*1,114
McKittrick	3,830	3,623	*207
Midway	41,865	36,097	*5,768
Mount Poso	13,460	14,210	750
Mountain View	8,530	9,469	939
Rio Bravo	6,570	7,704	1,134
Round Mountain	8,980	9,244	264
Ten Section	8,770	8,732	*38
Wasco	635	626	*9
Other Fields	2,520	2,649	129
TOTAL	248,935	233,004	*15,931
Coastal Counties			
Elwood	4,645	4,794	149
Rincon	2,995	3,825	830
Santa Maria	5,895	2,474	*3,421
Gato Ridge	2,215	3,640	1,425
Santa Maria Valley	19,180	10,555	*8,625
Santa Paula-Newhall	5,320	5,275	*45
Ventura Avenue	31,285	34,057	2,772
Other Fields	5,730	5,536	*194
TOTAL	77,265	70,156	*7,109
Los Angeles Basin			
Alamitos-Seal Beach	7,315	7,402	87
Brea-Olinda	8,435	5,379	*3,056
Coyote—East	2,865	2,438	*427
Coyote—West	7,810	8,157	347
Domingues	19,430	21,239	1,809
El Segundo	3,680	4,284	604
Huntington Beach New and Old	25,375	29,289	3,914
Inglewood	12,855	12,443	*412
Long Beach	42,555	52,384	9,829
Montebello	6,066	6,422	356
Montebello-West End	5,389	8,737	3,348
Playa del Rey	5,035	5,504	469
Richfield	7,575	7,954	379
Rosecrans-Athens	9,015	13,877	4,862
Santa Fe Springs	27,695	30,207	2,512
Torrance	15,485	18,747	3,262
Wilmington	69,260	82,247	12,987
Other Fields	3,075	3,271	196
TOTAL	278,915	319,981	41,066
STATE TOTAL	605,115	623,141	18,026

*—Shortage.

Bids for drilling Parcels W, X, Y, and Z, owned by the City of Long Beach were opened at the meeting of the Long Beach Harbor Board in Long Beach on January 14.

Repeal of the Connally hot oil act was proposed by Representative Coffee of Washington in a bill introduced in the House on January 10.

Carl Valentine Bloom

Carl Valentine Bloom, of the California Division of Oil & Gas, Los Angeles, was born in Sheridan, Wyo., Dec. 23, 1900. He lived in Muskogee Okla., from 1902 to 1920, when his family moved to Los Angeles. In 1928 he received the degree of Bachelor of Science in Petroleum Engineering at the University of California (Berkeley). He worked for Union Oil Co. until January of 1929, when he joined the staff of the Division of Oil & Gas. Mr. Bloom is married (May, 1929), has two children, George Harold and Karl V.

Walter J. Crown

Walter J. Crown, of the Los Angeles offices of the California Division of Oil & Gas, is a native of Oklahoma. He graduated from the School of Geology, Ohio State University, in 1923, when he joined the Empire Gas & Fuel Co., in Kansas. In 1925 and 1926 he engaged in mining work in Southern Nevada. From 1926 to 1928 he did work for Standard Oil Co. of California, and from 1928 to the present he has been with the Division of Oil & Gas. Mr. Crown is married and has two daughters and a son.

James McNeill

James McNeill, of Union Oil Co. of California, Santa Fe Springs, Calif., 28 years of age, was graduated by University of Southern California in 1933 with the degree of B.S. in petroleum engineering. Employed by Union Oil Co. of California in June, 1933, he worked in the field as rotary helper, well-puller, and head gager, and later was transferred to the petroleum engineering department. Currently, he is assistant production engineer for the Los Angeles Basin district, with headquarters at Santa Fe Springs.

A. P. I. Annual Meeting

Hydrocarbons in the Lubricant Fraction of Petroleum, Frederick D. Rossini. Abstract: The results are summarized of an experimental study, covering a period of five years, of the chemical constitution of the lubricant fraction of a Mid Continent petroleum, which has been carried on as one of the problems of the American Petroleum Research Project 6 at the National Bureau of Standards. A complete analysis with respect to size and type of molecules has been made of both the "water-white" oil and "extract" portions, which together constitute about 57 per cent of the entire lubricant fraction. The kinds of molecules in the "wax" portion, which constitutes about 35 per cent of the lubricant fraction, are known in a general way, but much less definitely than those in the "water-white" oil and "extract" portions. The kinds of molecules in the "asphaltic" portion, which constitutes about 8 per cent of the lubricant fraction, are surmised. The significance and interpretation of the data are discussed. It is pointed out, in terms of significant amounts, every hydrocarbon in the "water-white" oil and "extract" portions contains one or more naphthene rings, which is to say that there are no purely paraffinic or aromatic hydrocarbons in these portions. Taking the lubricant fraction as 100 per cent, the following approximate average analysis with respect to the kinds of molecules in this Mid Continent petroleum is reported: 1. About 43 to 51 per cent is composed of molecules with 1, 2, or 3 naphthene rings, together with the appropriate paraffin side chains. 2. About 8.3 per cent is composed of molecules with 1, 2, or 3 naphthene rings and 1 aromatic ring, together with the appropriate paraffin side chains. 3. About 8.1 per cent is composed of molecules with 2 naphthene rings and 2 aromatic rings (condensed) together with the appropriate paraffin side chains. 4. About 6.6 per cent is composed of molecules with 1 naphthene ring and 3 aromatic rings (condensed) together with the appropriate paraffin side chains. 5. About 18 to 26 per cent is composed of normal (straight-chain) paraffins, plus possibly some isoparaffins (branched-chain). 6. About 8 per cent is composed of the "asphaltic" constituents, which have not been investigated.

This is Jensen Bros. Mfg. Co.'s third airplane, a 1939 Waco N equipped with an RCA compass and powered with a 300 h.p. Jacobs engine.

The first ship, a Waco Custom Cabin, was purchased in 1937, the second, a Stinson, was placed in service in 1938.

In the picture are K. R. Jensen and W. G. Jensen (next to prop). Mr. and Mrs. W. G. Jensen are in South America on a four months business trip.

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Hercules Motors Corp. Now Has Houston Branch

Carrying out a program announced earlier in the year for sales and service expansion in the Mid-Continent field, Hercules Motors Corp. of Canton, Ohio, has opened a branch store at Houston. The store is located at 1319 Conti Street, and like the Kilgore, Texas branch which was opened several months ago, will carry a complete stock of Hercules engines, power units and replacement parts.

Both four-cylinder and six-cylinder engines and power units are available in the complete Hercules line of high-speed, heavy-duty Diesel engines. Hercules pioneered the modernization of the Diesel and has a far wider range of commercial and industrial applications than any other Diesel engine manufacturer. An outstanding market for Diesel as well as gas and gasoline engines is represented by the oil industry, and the Hercules program of expansion in the Mid-Continent field is in line with the company's policy to make dependable servicing of its products conveniently available to oil field operators.

It is announced that the company has plans for additional branches in the Mid-Continent field. All Mid-Continent sales and service activities are under the direction of A. B. Wehling, who has established headquarters at the new Houston unit. Mr. Wehling is assisted by a competent staff of Hercules-trained sales engineers and service mechanics.

Above is the only left-handed foursome, made up exclusively of oil men, that has played at the Hacienda Country Club. From left to right they are: J. C. Ballagh, Patterson-Ballagh Corp.; Elmer Wycoff, mill representative, National Tube Co.; Charles Perkins, assistant purchasing agent, Union Oil Co., and Wallace Rushing, district manager, E. H. Edwards Co.

Because enterprising termites had attacked the wood in the derrick, Shell Production officials at Ventura decided that the 17-year old structure should be demolished. Head rig builder, G. W. Selby, and assistant, J. A. Toye, dropped the 106-foot derrick within six inches of the originally plotted line. The operation was a ticklish one because high tension and telephone lines and the state highway provided obstructions and hazards should the derrick not drop as planned. All guy lines were cut and the derrick was felled in the same manner that a tree is brought to earth. Once everything was ready two minutes was all the time required to change the position of the derrick from the vertical to the horizontal. Photo shows derrick falling to the earth.

Stewart, Newhoff Advance In Union Sales Division

Appointment of A. C. Stewart as assistant vice-president in charge of sales, and W. A. Newhoff as manager of sales has just been announced by Union Oil Co.

Mr. Stewart has been manager of Union Service Stations for the past two and one-half years and has been actively identified with the company's sales organization since 1928. Other important sales positions held by Mr. Stewart include manager of specialty sales, and manager of sales for the Southern Division, embracing Southern California and Arizona. He graduated from Stanford University as a mechanical engineer and completed his education in the Harvard School of Business Administration.

Mr. Newhoff has been a member of Union Oil Co.'s sales staff for the past nineteen years. Beginning his employment in the San Francisco area, he rose through a consistent series of promotions to the post of assistant district manager at Los Angeles in 1929. Some four years later he was appointed Central Division manager, with headquarters in San Francisco. In 1937 he was again transferred to Los Angeles as manager of refined oil sales, and early in 1938 became assistant director of sales.

Vernon Tool Handles Save-A-Weld Process

Vernon Tool Co., Ltd., announce the conclusion of arrangements by which they become exclusive representatives of the Save-A-Weld process, Harmon Patents, in Central and Southern California. The Save-A-Weld process is a cold weld repair applicable to breaks or cracks in any type or size casting and is especially suitable for the repair of engine, compressor or pump parts such as cylinder heads, pistons, cylinders, inlet or exhaust boxes, frames or manifolds. It can be applied to any crack or break which can be reached and worked on with a portable drill or grinder. In making the repair, a series of holes are drilled across the crack at right angles, as close together as possible and are then opened into each other until all the holes in each series are joined. These holes vary in number and size, depending on the requirements of the particular job, and do not go entirely through the section being repaired. When this operation is completed, the steel links shown in Fig. 1 are placed one at a time into the connected series of holes, each link being securely set or swaged into place before the next is added, until when finished, a bridge or link of high strength steel holds the fracture together in place, strengthening the entire section. If it is necessary to seal leaks as in the case of cylinders, pistons, water boxes, etc., a series of bridges is built into the fracture for its entire length, thus sealing against leaks and pressure as well as preventing the further extension of the fracture.

Among the advantages claimed for the process are that it is economical and saves both time and expense in dismantling and stripping the parts as the repair can usually be made in place; it is permanent and not affected by heat, pressure, corrosion or electrolysis; it holds and strengthens the section repaired without exerting spreading pressure or setting up any new heat strains in the part. It has been used successfully on cast iron, brass, aluminum and various other metals.

Shell Christmas Party Has Record Attendance

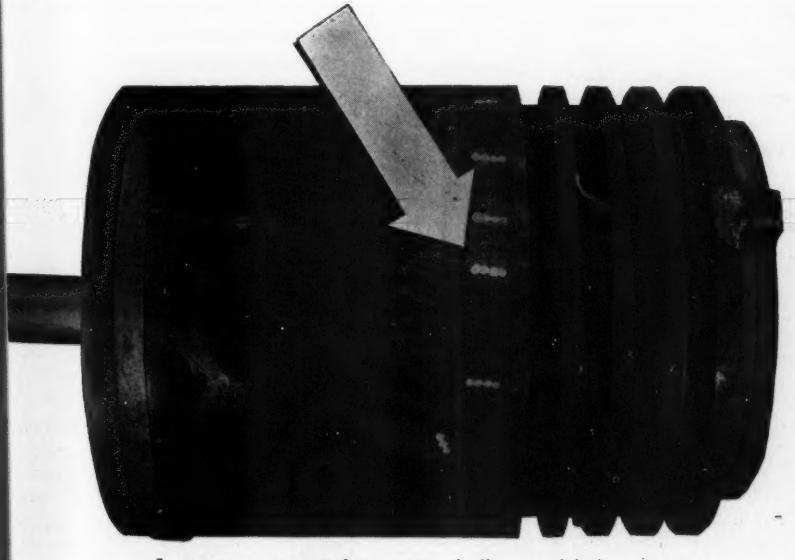
One evening last month, seven days before Christmas, 1120 people who are Shell employes, Shell wives, Shell sweethearts or Shell friends, jam-packed the biggest ballroom in Los Angeles' swank Ambassador Hotel to take part in a Christmas party and dinner dance that broke every attendance record in the history of the Shell family.

They renewed old acquaintances and made new friends. They talked of business, politics, home and people. Smartly-gowned ladies and their escorts danced in turns, there were so many. Able master of ceremonies, Don Baird, Los Angeles division salesman, microphoned an imaginary line through the center of the huge banquet room and allowed only half the people to leave their tables at one time.

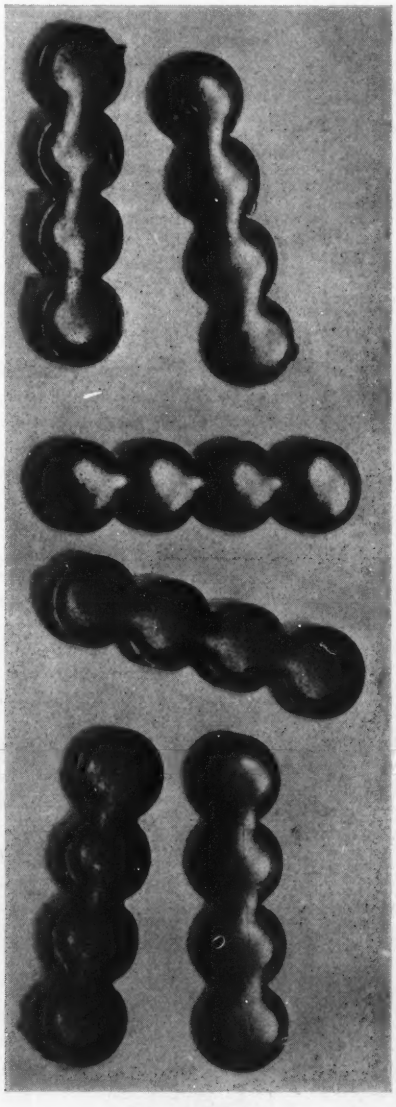
Before the dance a few were skeptical. It would be too crowded. Actually, those attending the dinner party, reported it to be the most enjoyable get-together of Shell people ever staged in the area. It brought together men from every branch of Shell's diversified business in a single, social group.

Shell executives who spoke briefly before the microphone, extending kindest holiday greetings, were: J. U. Stair, vice president; Frank Rehm, newly-appointed manager labor relations; R. B. Jensen, Los Angeles division manager; J. W. Southworth, Southern California division manager; and I. M. Hemphill, Wilmington refinery manager.

Many employes working together as committees were responsible for the party. R. Jonason, Southern California division office manager, E. M. Overstreet, personnel department and Don Baird were the three members of the major committee in charge of general direction and management. Sub-committee members were: Ruth McAdams, Bonnie Watson, Louise Schock, Mary Curley, Kay Johnson, Dorothy Clausen, Norma Thompson, Edna Norton, George Harvey, Roy Wyatt, Margaret Block, E. C. MacIntyre, W. P. Butterfield, Brown Kincheloe, Doris Fenton, B. J. Wilhelm, W. Gardiner, Ada Brummette, Millicent Angell, Luella Smith, Margaret McGrath and J. H. Runkle.



A permanent repair by means of alloy steel links.



Alloy steel links.

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1938-1939

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Between the two covers of California Oil World Directory you will find a wealth of data never before contained in a single volume for quick reference.

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Of even greater importance than the Statistical Information, will be a complete Directory of all Western Oil Operators, listing not only the names, addresses, officers, field and refinery superintendents, corporate details and financial structures, but facts as to land holdings, proven acreage, number of wells, refineries, pipe lines, marketing facilities and figures on production and sales by products.

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California OIL WORLD Directory

Meeting for the first time in their new home, 2919 Gardenia Ave., Long Beach, are shown the members of the board of directors of Hamer Oil Tool Co. Standing, from left to right, are Charles D. Anderson, A. R. Loud, Dr. Paul A. Dewhirst, and Vernon Zillgitt. Seated, left to right, are N. K. Anderson, L. S. Hamer, and Ramona Zillgitt.

Hamer Oil Tool Moves Into Large New Quarters

Hamer Oil Tool Co., manufacturers of plug valves, line blinds and other tools for oil producers and refiners, have moved into larger quarters at 2919 Gardenia Ave., Long Beach, Calif. The new location provides considerable additional work shop space as well as office room, so that the company's extensive experimental campaign will be carried on more effectively, and the increased demands of the industry met promptly.

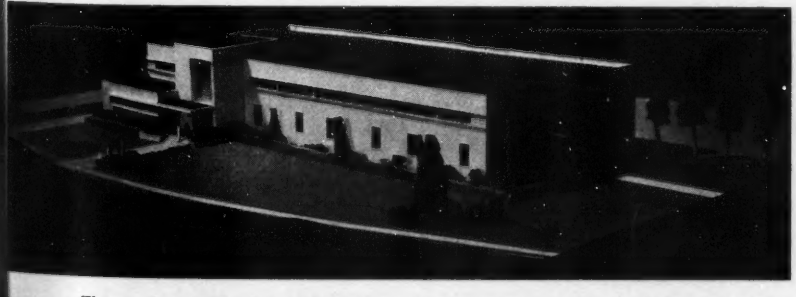
Hamer tools are distributed in the Mid-Continent by Well Equipment Manufacturing Corp., Houston, Texas, and foreign distribution is handled by R. J. Eiche, 228 43rd St., Manhattan Beach, Calif.

Research Laboratory Building To Cost Standard $320,000

A new research laboratory building, costing about $320,000, is under construction by the Standard Oil Co. of California adjacent to its refinery on Standard Avenue at Richmond, Calif. The building design reflects the study company experts have made of modern laboratory facilities throughout the United States. The building is in many ways unique both in its highly modernized exterior design and facilities for its technical staff. The very latest forms of artificial illumination and complete air-conditioning have been employed, to assure the most comfortable and efficient working conditions possible. There will be approximately 30,000 square feet of floor area.

The entrance lobby to the building will be two stories in height and flooded with light from a large vertical panel of glass brick. Immediately off the lobby will be a library and reading room. The remainder of the first floor will contain twelve large laboratories, a locker room, and a dispensary for chemicals and supplies. On the second floor will be located about thirty offices, housing the administrative personnel of the department as well as photographic and electrical laboratories.

Various novel improvements in the construction of work benches, disposition of service lines, shelving, and means of supporting apparatus have been incorporated in the design of the building.



This is the architect's model of Standard's new laboratory building.

New home of Hamer Oil Tool Co.

This company has already a large four-story research and development laboratory building at the Richmond refinery, which will continue to be used. The new structure is to augment present technical facilities and make possible the utilization of the most advanced equipment and practices, which this company demands at all times in all phases of its technical control and development activities.

Copy of the decision of the Court of Common Pleas of Dauphin County, Pennsylvania, holding the Pennsylvania price fixing law unconstitutional, is available for inspection in the files of the California Oil and Gas Association.

American oil development has started in Cuba's Santa Clara province.

Assuring speedy service in the installation of Genuine Bettis Protectors is the recent arrangement whereby Medearis Oilwell Supply Co., 8638 Otis St., South Gate, Calif., becomes California distributor for these well known protectors. The trained Medearis service men will install the protectors with safe hydraulic equipment which puts a protector on a single joint as easily as on a double or full stand. Shown above are Paul A. Medearis, president of Medearis Oilwell Supply Co.; Byron H. Barnes, president of Bettis Rubber Co., and, right, Harry M. Taylor, a Medearis partner.

Business and Professional Directory

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Oil Men's Calendar

C.N.G.A. Meeting First Thurs. Each Month.

February

16—Industrial Marketers of So. Calif.—Round Table Discussion of Advertiser's Problems. University Club—6:30 P.M.—Dinner optional.

20-24—12th National Asphalt Conference auspices of The Asphalt Institute, Biltmore Hotel, Los Angeles.

March

22-24—The American Association of Petroleum Geologists 24th annual meeting, Oklahoma City, Okla., Skirvin Hotel, headquatrers.

April

24-29—Oil World Exposition, Inc., Houston, Texas.

Sale of oil and gas leases where prospecting is being done on adjoining land was held by the United States District Court in San Francisco to be in effect the sale of a "security."

Boll weevils—new worker who doesn't know his who's who!

Total motor vehicle user taxes during 1938 are estimated by the Automobile Manufacturers Association at $1,525,000,000, and gasoline taxes, Federal, state and municipal, are estimated at $970,000,000. The percentage of motor user taxes to all taxes from all sources, Federal, state and local, is estimated at 1

Under provisions of the Federal Aid Highway Act of 1938; the Secretary of Agriculture has announced the apportionment of $135,000,000 to aid the states in highway improvement and grade crossing elimination during the fiscal year 1940, which begins July 1, 1939.